GLOBAL 500 THE WORLD'S LARGEST CORPORATIONS P. 117

FORTUNE

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THE UNCROWNED KING OF TECH
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HUMANS ARE UNDERRATED

THE 3 SKILLS YOU NEED TO THRIVE IN THE NEW WORKPLACE *

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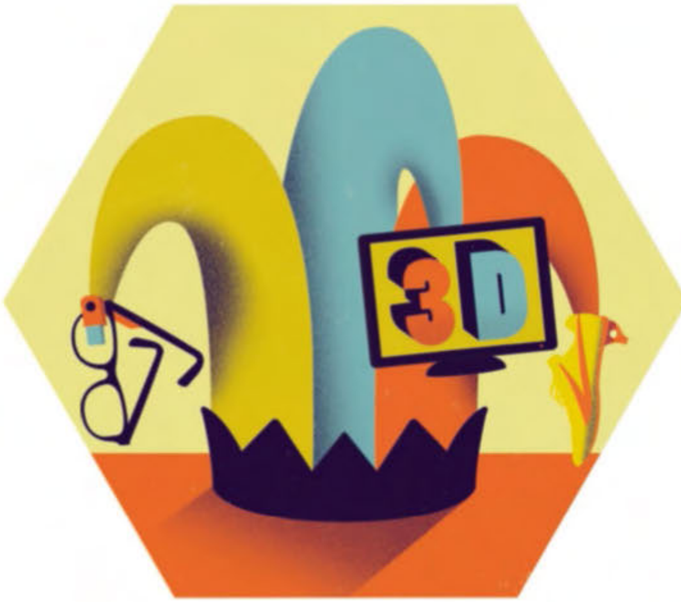
DISPLAY UNTIL AUGUST 24, 2015


PATEK PHILIPPE
GENEVE

SCOTT STEINBERG

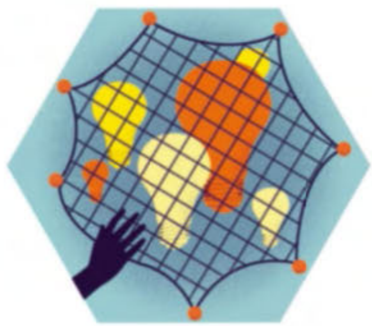
MASTER TREND SPOTTER

Identifying major trends is crucial for ensuring your company's success. Jumping on the next big fad? Not so much. Here, leading business strategist and innovation consultant **Scott Steinberg** reveals how to tell the difference so you can find the next big thing.



Don't Be Fooled by Fads

"Don't place your bets on things that are merely popular; look for something with lasting potential. Many people thought 3-D TV was going to be big. But it was more like a fad because it wasn't something the consumer felt they needed. Contrast that with smartphones, which have changed the way we do business, relax and entertain ourselves."



Listen to your Customers

"In a consumer-driven economy, they often prove to be the source of the most innovative ideas."

Stay on Your Toes

"It may sound like common sense, but the first thing you need to do is to just get out there and keep your eyes and ears open. Look at what's going on around you."

Cast a Wide Net

"You need to hedge your bets. Don't look to spot the next big thing—singular. Look for the next big things—plural. That way you can insulate yourself from the fads that inevitably fall by the wayside."

It took years for Scott Steinberg to acquire his expertise so he could help your business boom, but you can easily master the way you bank in minutes.

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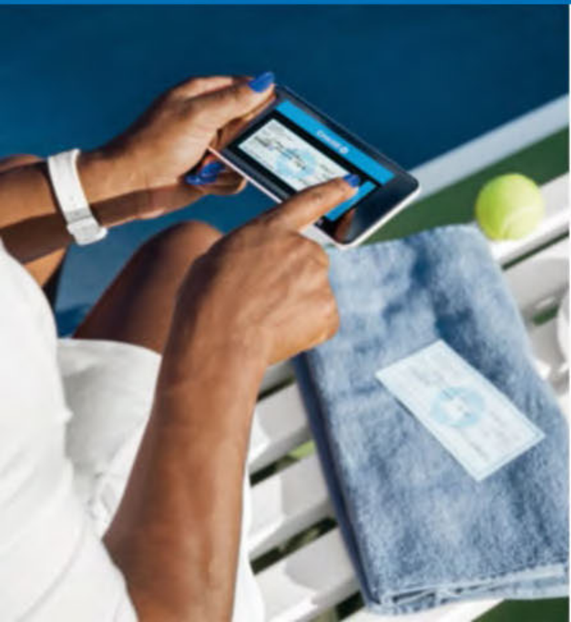

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Jay Y. Lee, vice chairman of Samsung Electronics, No. 13 on the Global 500

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Fortune Global 500

It was a topsy-turvy year: The 500 biggest companies in the world ranked by revenue set a new record in sales in 2014, but total profit fell by 15%.
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COVER: ROBOT ARM CG BY SIMON DANAHER; THIS PAGE: PHOTO ILLUSTRATION BASED ON PHOTO BY LEE YOUNG HO/SIPA—AP

ON THE COVER: PHOTOGRAPH BY **ADAM LEVEY**
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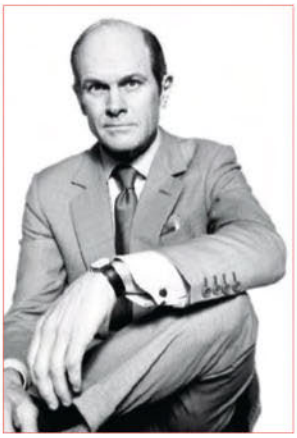
PHOTOGRAPH BY **BENJAMIN RASMUSSEN**

Robots Need Not Apply

"STUDY STEM" is the modern mantra of advice for young people. Technology is wiping out jobs. Software is eating the world. If you want to survive and thrive, you must learn to write code or wrestle data. The geek shall inherit the earth.

As a onetime literature student, I've long been uncomfortable with the STEM stampede. But I couldn't fully articulate my discomfort until reading the galley proofs of Geoff Colvin's captivating and convincing new book: *Humans Are Underrated*. His thesis, brilliantly argued in the adaptation that begins on page 100, is simple: We've spent most of the past two centuries trying to get humans to act more like machines. But as we perfect machinery, that strategy is making workers ever more redundant. What we need in the future instead is for humans to act more like humans.



Geoff Colvin has been working at *Fortune* since 1978.

The profundity of this argument hit me during a discussion I led at *Fortune*'s Brainstorm Tech conference in July among an elite group of 20 business leaders (page 20). Among them were the CEOs of Sprint, Best Buy, Sears, Electronic Arts, Athena Health, Juniper Networks, and Flextronics; top venture investors for Google, Comcast, Microsoft, and Qualcomm; the incoming CEO of HP's printer and computer business; the president of CVS pharmacy; and the CEO of drone startup CyPhy Works. (For some reason this kind of group can be assembled only in the mountains of Aspen, Colo.) The topic was how technology is transforming enterprises. The consensus was that the speed of change has never been greater, and is transforming businesses and upending business models at breakneck pace.

Yet when the conversation turned to meeting this mammoth challenge, it quickly veered from technical issues to very human ones. How do you decide which technologies to embrace and which to ignore? How do you get middle managers to abandon approaches that have worked for them for decades and adopt new ways? How do you build a culture within a company that's open and excited about change rather than resistant to it? How do you create organizations that learn from startups and are willing to disrupt themselves rather than protect what they know?

Those questions reflect the three broad skill sets that Geoff says will define the role of humans in a hyper-tech workplace. We will remain in charge and need to make smart decisions. We will need to work together to set collective goals. And we alone can satisfy the deep social needs of human organizations. For these jobs robots need not apply.

Geoff's wise observations grow out of 37 years of reporting for *Fortune* magazine, during which he has interviewed too many CEOs to count. His longest relationship is with FedEx's Fred Smith, whom he first interviewed 34 years ago. Over the past three and a half decades, his work for this magazine has taken him around the world; he has watched the manufacture of locomotives, jet fighters, Hershey's Kisses, earthmovers, and, despite Bismarck's warning, sausages.

We think his new book will change the way people think about the future. Take time to read it.

Also in this issue: *Fortune*'s Global 500, our exclusive ranking of the largest companies in the world by revenue. Together, these companies had $31 trillion in revenues last year, accounting for 40% of the world's GDP. And while a U.S. company—Walmart—still tops the list, it's worth noting that a Chinese company (Industrial & Commercial Bank of China) came in first in profits for the first time. China has a total of 98 companies on the list, up from 19 a decade ago.

ALAN MURRAY
Editor
@alansmurray


Finding the right people would be easier
if your HR team had the right software.
Good talent moves fast. But your bundled HR software is old and slow. Successful talent acquisition now requires its own dedicated software suite with social, mobile, and video tools. iCIMS empowers your company to find, screen, and hire the right people. Faster. Get growing. Visit icims.com
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REINVENTING OPERATIONS, REDEFINE SUCCESS

THE NOUVELLE ENERGY COMPANY FOR ASEAN

HARMONIZING THE ASEAN ENERGY SECURITY

With the number of people living in Southeast Asia is estimated to grow from 625 million people today to 690 million people by 2020, the thirst for increasing energy demand will be the biggest challenge of this century to face every single ASEAN countries. Since the 2015 aim for ASEAN Economic Community (AEC) is on the horizon, it is compulsory that all ASEAN countries must synergize and develop its people and limited natural energy resource together to create regional energy security and stability as well as ensure equitable economic prosperity for all its member countries.

The ASEAN economic success of the region of over 5% growth a year over the past 15 years and the socio-cultural evolution as increasingly more people are moving into urban area have led to the greater demands for energy. According to ASEAN Statistics, ASEAN total trade in 2014 was $2.5 trillion making ASEAN it the eighth largest regional economy in the world. To no surprise, the biggest intra ASEAN Trading are oil and gas trading followed by electrical appliance and components and plastic trading at $174 billion (29%), $115 billion (19%), and $24 billion respectively (4%).

PTT Group has proven that it has made differences in ASEAN's energy future through innovation along with strategic investment and partnership. Since 2014, PTT Group has the great honor to take a key role to nurture ASEAN cooperation in the energy development through ASEAN Council on Petroleum (ASCOPE) as the ASCOPE Secretary in Charge (ASIC). Alongside the cooperation at the governmental level, PTT Group has made the impacts in every ASEAN country. For example, in Brunei, PTT helped the local producers to increase the value of their export crude oil production through trading in the global market; in Cambodia, PTT Group is supplying the LPG and Petroleum products for domestic consumption; in Indonesia, PTT Group is exploring growth opportunity in exploration and production and petrochemical production and trading; in Laos, PTT Group is building hydropower and developing oil and retail business; in Malaysia, PTT has a joint development area for natural gas; in Myanmar, PTT Group is working with the local company to provide petroleum product and improve existing energy infrastructure; in Philippines, PTT Group is enhancing its existing petroleum and retail business to better cater to changing life style; in Singapore, PTT Group is expanding its crude oil, condensate, petroleum petrochemical products, and other commodities trading; and in Vietnam, PTT Group is helping to build a large scale petrochemical refinery complex.

For the PTT Group, the key to successful energy business in ASEAN is all about collaboration and sharing limited resources from technical skills and technology to capital and opportunities. PTT Group believes that only by working together among ASEAN countries, it will lead to the sustainable future for ASEAN.

ptt Group

Macro

CLOSER LOOK

PHOTOGRAPH BY **CHRISTOPHER LANE**

IN APPAREL, IT'S THE QUICK AND THE DEAD

Ailing American fashion icons Gap, J.Crew, and Abercrombie & Fitch are overhauling their business models to adapt to a faster, cheaper marketplace. H&M and its ilk may still eat their lunch.

By Phil Wahba

An H&M store in New York City. The fast-growing Swedish chain has 370 stores in the U.S. and is building dozens more this year.

OVER THE PAST 12 months, American apparel icons have gone decidedly out of style.

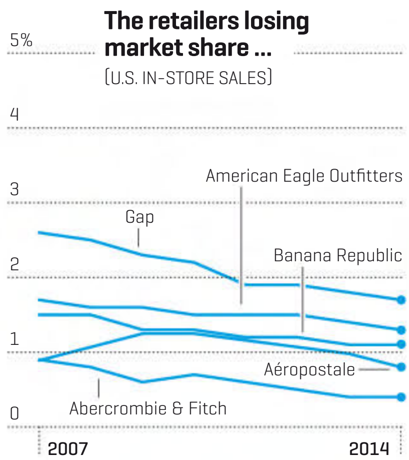
J. Crew, a label favored by First Lady Michelle Obama, suffered $1 billion in write-downs. Aéropostale's market value halved. Ann Taylor closed dozens of locations before its parent company sold itself to Ascena Retail Group. And Gap, the quintessential American brand, announced it would close about a quarter of its North American stores, hobbled by years of market share losses.

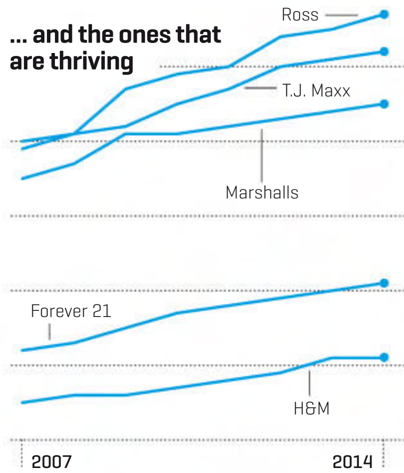
In an industry that could use a fairy godmother, some execs are now putting their faith in pixie dust—or make that the Pixie Ankle Pant.

Gap Inc.'s leadership, for one, holds up this relatively humble $35 trouser, sold by its Old Navy subsidiary, as a template for the company's turnaround. Cheap, quickly assembled, and on trend, the Pixie showcases the benefits of the practices U.S. retailers have failed to implement for years, the ones they will need to adopt if the American fashion industry is going to stay viable.

The defining characteristic of the cropped, printed stretch pant is the supply chain that produced it. Right now U.S. companies take about nine months to get a product to market. That's twice as long as "fast fashion" retailers like Sweden's H&M, Spain's Zara, and Japan's Uniqlo. The result: Gap et al. end up with excess inventory they're forced to sell cheaply when it's no longer in style.

Old Navy's pixies are the result of a new, quicker, and more flexible manufacturing model. The brand rolls out pieces in small batches to test demand before mass-producing them, works more closely than ever with suppliers, and accommodates new trends by





keeping a stockpile of fabric on hand. The strategy has paid off so far: After a deep slump, over the past four years Old Navy has added $1 billion in sales and is growing quickly. Gap is now looking to replicate this system at its namesake brand and Banana Republic. Abercrombie & Fitch, Ann Taylor, and J. Crew are similarly looking to respond faster to changing tastes.

"There has been a dramatic shift in power to the consumer," says Oliver Chen, a retail analyst with Cowen & Co. And what the consumer wants is the latest trends, more quickly than ever. "In many cases [the customer] is faster than the market right now," says Old Navy EVP Jodi Bricker.

But speed and flexibility are only part of U.S. apparel's Hail Mary pass. The industry also needs to wean shoppers from those 40%-off sales. U.S. brands have descended down the discount rabbit hole to keep up with the super-cheap fast-fashion shops, as well as ascendant off-price stores like Ross and T.J. Maxx. The discounting, in turn, has forced them to lower the quality of their clothing to protect their margins.

Companies are now looking to claw back at least some of the damage to their brands wrought by that approach. Abercrombie & Fitch has ditched its logos and is improving its fabrics and washes. Banana Republic customers can look for a bit more stretch in the fabric or a more complicated stitch in a sweater. And Gap brand president Jeff Kirwan has called better quality the "foundation" of the brand's turnaround.

Whatever U.S. outfitters do, they need to do it quickly if they want to hang on to their remaining market share (see charts). Uniqlo has 42 U.S. locations and counting, up from only a handful four years ago. H&M's U.S. store fleet is now within spitting distance of Gap's, with 370 U.S. stores and dozens more to come this year. Gap will soon be down to 500 full-line stores, less than half their 2000 peak. And in the fall, all these companies will have a new rival to fear: Primark, an Irish fast-fashion chain that has taken Europe by storm, with prices that strike terror into even H&M.

Primark, too, sells printed cropped stretch pants—they cost $12.41.

YOUNG BUCKS

CHICAGO'S OTHER SCHOOL OF ECONOMICS

THIS IS A RARE feel-good story about financial literacy. In 1996, John Rogers, head of $11 billion Ariel Investments, helped start an elementary school focused on financial education in a low-income neighborhood on the South Side of Chicago. Each class gets a portfolio and buys and sells its own stocks. Students get a portion of the gains at graduation.

So far the Ariel Community Academy has disproved doubters (including me—I wrote an article a decade ago skeptical of financial education and mentioned the school). It now offers one of the strongest cases for teaching finance early. Students at the academy, which today goes up to the eighth grade, consistently out-test the city and the nation.

They're also getting jobs. Last year Rogers hired his first Ariel graduate, Mario Gage, 23, in the marketing department. Gage was in the school's second graduating class, before going on to study economics at the University of Chicago. His brother, also an Ariel grad, landed an internship at a hedge fund.

Given Ariel's success, Rogers hopes other firms will follow its lead and partner directly with schools. "We need to jump-start job creation in urban areas," he says. "Financial literacy is a big part of that." Gage thinks so too. "The school put a lot of possibilities in my brain," he says. "It definitely works."
—*Stephen Gandel*

John Rogers's school for financial literacy is proof that the model can work.

GRAPHIC SOURCE: EUROMONITOR. DOES NOT INCLUDE INTERNET SALES; SCHOOL: VICTOR POWELL.

A WATERSHED FOR WATERSHEDS.

Half of the Everglades has already disappeared. Now the remaining half of this fragile ecosystem is at risk from pollutants in stormwater runoff.

The problem has been decades in the making. But the millions of Florida residents, visitors and native animals relying on this watershed don't have decades to wait for a solution. So the South Florida Water Management District designed innovative wetlands for stormwater treatment and Citi found a smart, speedy way to finance their construction. Now, clean water from those wetlands is replenishing the Everglades and an incomparable global landmark is on the mend.

For over 200 years, Citi's job has been to believe in people and help make their ideas a reality.

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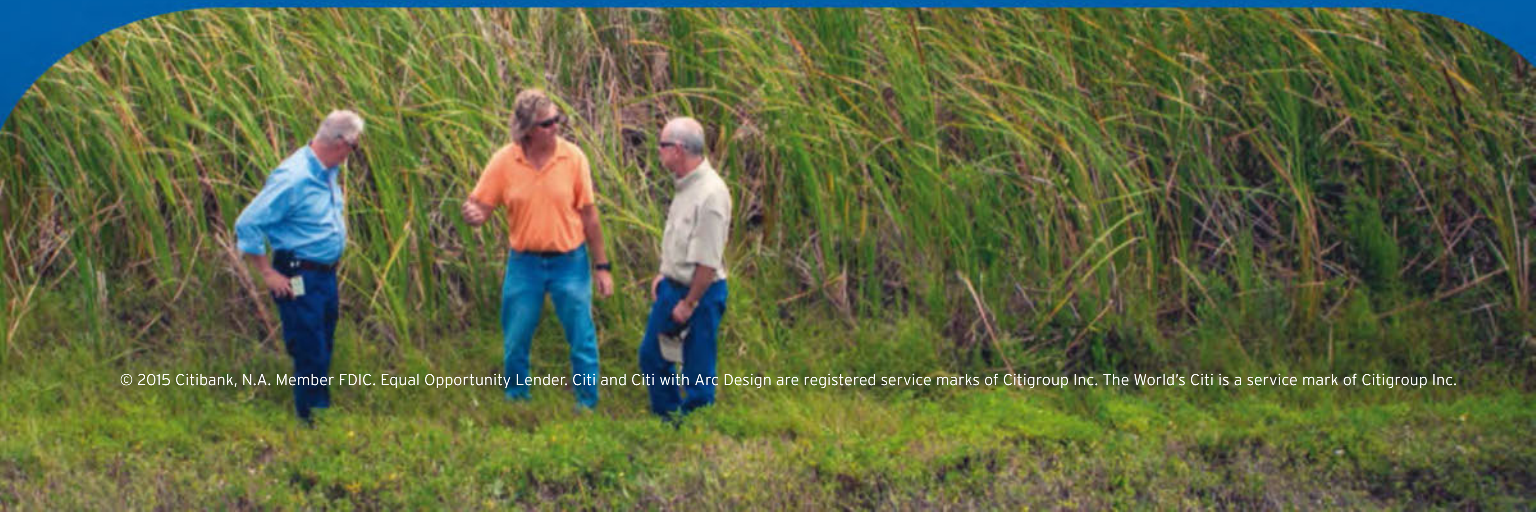

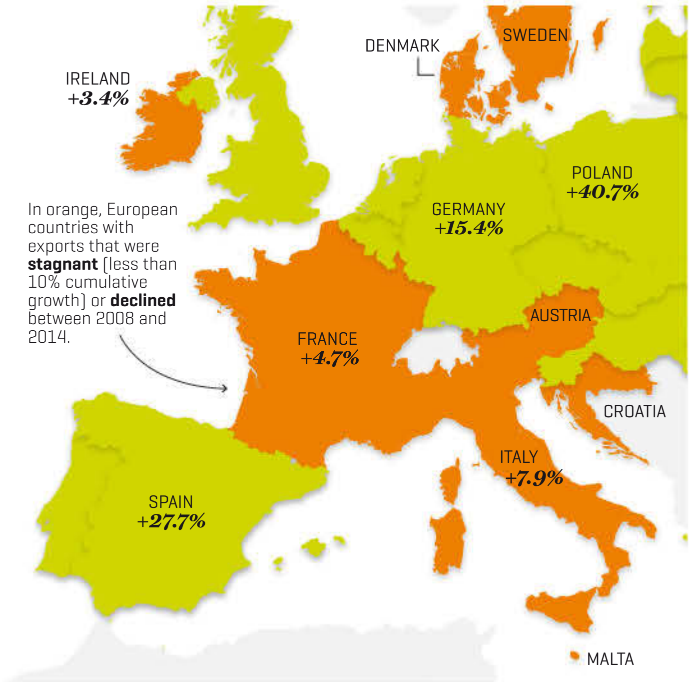

Export growth has stagnated in France and Italy, Europe's second- and third-largest economies.

CRISIS ECONOMICS

Europe's Real Problem: France Can't Sell Cars

THE WAY GREECE is hogging headlines and tormenting heads of state, you'd think a "Grexit" is the biggest threat to the eurozone's future. It isn't. The greatest danger—and it's being mostly ignored—is the shocking slide in competitiveness of the single currency's second- and third-largest economies, France and Italy. One ailment encapsulates Europe's *énorme problème*: France can't sell cars.

Put simply, the cost of making products in France is far higher than in the nations it competes with. The hourly labor expense of manufacturing a car or steel beam in France rose 17% over the past decade, more than twice the increase in Germany. And even though wages have merely tracked inflation since 2008, costs keep climbing because workers are getting less and less productive. That's chiefly because France's manufacturers are so starved for profits that they can't afford to replace or refurbish antiquated plants and IT systems.

By contrast, Ireland, Spain, and Portugal have all acted while France fiddled, liberalizing their labor markets and lowering unit costs over the past six years by 7% to 12%. The results have been disastrous for France's competitiveness. In the past 10 years its share of all EU exports dropped from 12% to 9.5%, the worst performance of any major country in Western Europe.

And it's not just France that's struggling. Italy's products are now even pricier. From the late 1990s to mid-2000s, Italy's manufacturing costs exploded. "Italy is the nation I'm watching," says Uri Dadush, an economist at the Carnegie Endowment. "It's lost an enormous amount of competitiveness to Germany, and things aren't improving." Despite the reform efforts of Prime Minister Matteo Renzi, Italy still sets wages mainly by national labor agreements that ensure pay rises faster than output.

That brings us to the economic bellwether for the two nations—cars. Both France and Italy mainly manufacture inexpensive autos. Because they're basic transportation, the Peugeots, Renaults, and Fiats require low prices and low costs to sell well at home and in other European nations. Germany, which has lower costs and sells more luxury cars, isn't subject to the same constraints.

In the past decade the number of cars sold in Western Europe by France's Renault and Peugeot dropped from 3.5 million to 2.5 million. Meanwhile, the number of cars sold by Germany's VW, Daimler, and BMW increased by 200,000 to 4.5 million, despite a decline in the European market.

That downward trend reversed in the first four months of this year, as French and Italian exports surged. But a main catalyst was the decline in the value of the euro vs. other world currencies. That will take the countries only so far. Only reductions in pay, shedding rigid labor laws, and a move to high-margin products will revive their flagging exports, and both France and Italy are regressing as their rivals march forward. The euro's next existential crisis won't arise from a weakling state but from these two large, pivotal economies that too few are watching. —*Shawn Tully*

THE D.C. AGENDA

BIG BUSINESS TAKES AIM AT "BIG BUSINESS"

In today's political climate, Big Business is not a good look. Conservatives are pulling the GOP away from its traditional defense of large companies toward a more free-market approach. But the canniest corporate lobbyists are adapting: To win hearts and minds in D.C., they're reframing their agenda as part of the broader crusade against unfair subsidies. Companies that can successfully label their competitors as crony capitalists stand to benefit mightily. —*Tory Newmyer*

BOEING VS. DELTA

Delta in 2012 started attacking the Export-Import Bank for helping its foreign competition finance purchases of Boeing jets, and conservatives warmed to the cause. Their alliance just cost the bank its charter.

SUGAR VS. CORN

Heated rhetoric from free-market crusaders like Grover Norquist is giving Cargill and others a potent assist in their bid to zero out federal sugar subsidies—and preserve share for corn sweeteners.

WIND VS. FOSSIL FUEL

The Koch brothers run a fossil-fuel-based empire. They also have unrivaled summoning power on the right, which they're using to tar the production credit for wind energy as a tax-code giveaway to the wind industry.

CHART SOURCE: EUROSTAT

ILLUSTRATIONS BY **MARTÍN LAKSMAN**

The Lexus hover board (shown) is under development in Spain.

THE FUTURE

WHY WE'RE STILL WAITING (AND WAITING) FOR FLYING CARS

EVER SINCE THE DAWN of the motor vehicle, dreams of empyrean automobiles have stirred the popular imagination. The phrase has become shorthand for innovation, but also an emblem of a future that never came. As venture capitalist Peter Thiel famously lamented, "We wanted flying cars, instead we got 140 characters."

But now that future may be closer than most people realize. In the past month alone, the U.S. Department of Defense partnered with a U.K.-based startup to assemble a *Star Wars*–esque hover bike in Maryland, Toyota's European Lexus division unveiled a *Back to the Future II*–style hover board in Spain, and a Dutch engineer built a levitating drone-throne in his backyard.

There are actually plenty of car variants out there that will get you from point A to point B without touching the ground. The problem is they function only on a very small scale. High costs, regulations, and physics have prevented anyone from making more than a few vehicles, or going very far on them.

There's reason to think that could change, though, says flying-car evangelist Paul Moller. Amazon has successfully lobbied for looser restrictions for flying and testing commercial drones. Lightweight, superstrong carbon-fiber materials are becoming significantly less expensive thanks to economies of scale. And the cost of flight-stabilizing computer systems has nose-dived now that the drone craze has taken off.

These developments have contributed to an air-saturating excitement in the field. Moller, an aviation expert—and depending on whom you ask, a modern-day Don Quixote—has spent decades trying to get his "Moller SkyCar" off the ground. (It flies, but not that far.) He's still optimistic, he says, despite having sunk $200 million into the project and not yet having a model on the market.

In the near future, Moller says, the technology will evolve from a rich man's hobby to a means of transport for family vacations. He gives it about five years for flying cars (rentals, mostly) to become mainstream. Whether or not that happens, it's nice to know they exist, if only in the backyard. —*Robert Hackett*

MARKET JITTERS

THERE ARE REASONS TO WORRY ABOUT CHINA. ITS STOCK MARKET ISN'T ONE OF THEM.

Over a three-week period this summer, China's stock market plummeted 30%—erasing a staggering $3 trillion in value. The fallout? Not so bad. China's markets are smaller than in the U.S., most households don't have any exposure to them, and they're more prone to booms and busts. The more pressing question lies in whether the country can make a smooth transition away from a manufacturing economy and cool its rapid growth without triggering other economic problems—this time with real global ripple effects.

1990
The last year China's GDP growth was below 7%, as is expected this year—and every other year for the foreseeable future.

286%
China's debt-to-GDP ratio. It's higher than any other developing nation's, and is largely tied to the overheated real estate sector.

44
Countries that rely on China as their largest export market (quadruple the number a decade ago), and that could be vulnerable to slowing growth.

MY METRIC

WHAT TO LOOK FOR IN THE HOUSING MARKET "One particularly informative way to gauge the market is to look at how many new homes are sold before they're completed. If it's a lot, it shows supply isn't keeping up with demand, driving people to snap up new homes earlier in the construction process. That number was 75% during the boom, about 50% during the bust, and is 66% now—still on the low side, and slipped a bit this year. The recovery still has a long road ahead." —*Jed Kolko, housing economist*

HOVER BOARD: COURTESY OF LEXUS; KOLKO: COURTESY OF TRULIA; CHINA DATA SOURCES: UBS, MCKINSEY GLOBAL INSTITUTE, WORLD BANK

LETTERS FROM THE CO-CHAIRS OF *FORTUNE BRAINSTORM TECH,* OUR ANNUAL INDUSTRY CONFERENCE IN ASPEN

ADAM LASHINSKY

ON THE EMANUEL BROTHERS

Brainy, charismatic, tenacious, combative, accomplished, fun loving: These are just a few of the characteristics two of the three Emanuel brothers displayed, in large dollops, during the opening evening of *Fortune* Brainstorm Tech. Rahm, the mayor of Chicago (above left), talked about lengthening the school day for the city's children and compelling Chicago's world-class cultural institutions to contribute to less posh corners of town. Ari, the country's most famous Hollywood agent, explained his shift to CEO of WME-IMG, a giant, private-equity-controlled entertainment and talent-management concern. More than political and business acumen, though, the Emanuels displayed two kinds of love public figures seldom show: an abiding affection for each other and a passion for their jobs.

ANDREW NUSCA

On his favorite exchange during Adam Lashinsky's interview with SoftBank president **Nikesh Arora:**

Lashinsky: **"Uber wants that [Asian] market, right?"**

Arora: **"Yeah, I want a lot of things in life too."**

(SoftBank invests in Uber rivals Ola and GrabTaxi.)

MICHAL LEV-RAM

On the Feats of Female Founders

Stanford's Graduate School of Business has long been considered the top institution for entrepreneurs. But Harvard Business School, its competitor to the east, is more than just catching up. When it comes to female founders who are raising capital, Harvard tops Stanford—and it was abundantly clear on the Brainstorm Tech stage that it's no fluke. "Building a fleet of alumni of both men and women who see women as leaders is really important," Birchbox co-founder Katia Beauchamp [below left] told a captivated audience. [She went on to announce a new virtual-reality "experience" for her male customers.] Two more female HBS grads, CloudFlare co-founder Michelle Zatlyn [right] and Stitch Fix founder Katrina Lake, agreed. Collectively the trio have amassed more than $190 million in funding for their companies—proving that Stanford isn't the only cradle of entrepreneurial success.

Miss this year's conference? Watch the highlights at fortune.com/brainstormtech

DAN PRIMACK

ON THE WINNER OF 'UNICORN IDOL': NATALYA BRIKNER

It takes courage to stand in front of the world's top technologists and pitch your startup as a countdown clock ticks. Natalya Brikner showed it in spades as she explained the idea behind Accion. Small space satellites are easy to build, but propulsion is a problem. The company's answer to bulky tanks and explosive propellants? Tiny, efficient computer chips. Judges Brad Feld, Amy Banse, and David Stern—plus the audience—thought the idea was out of this world.

PHOTOGRAPHS BY BENJAMIN RASMUSSEN


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A SERIES FROM THE EDITORS OF FORTUNE AND Sports Illustrated

Lodish runs a taste test at the factory where he makes his peanut brittle.

PRO-FILES

AN NFL VETERAN TACKLES A SWEET NEW GIG

After playing in a record six Super Bowls, **MIKE LODISH** built a company around a family candy recipe—and learned that entrepreneurship is "much tougher" than football.

By Alexandra Fenwick

IN A SPRAWLING manufacturing facility in an industrial park in Warren, Mich., Mike Lodish cuts a curious figure as he strides across the factory floor. An imposing 6 feet 3 inches and 275 pounds, Lodish wears a white lab coat and a hairnet over his gleaming bald head as he strolls the production line, towering over the contract workers who are cooking, cooling, and packing delicate chunks of his signature product. Leaning over a copper kettle of bubbling, golden brown syrup, Lodish inhales the wafting scent—the caramelizing sugar smell of a campfire marshmallow roast gone wonderfully awry.

The vat of liquid candy will yield 40 pounds of Lodish's Champion Brittle, a family-recipe confection that Lodish has turned into an entrepreneurial focus. After 11 years in the NFL, Lodish has graduated from the crunch of colliding with an opponent's shoulder pads to the crunch of biting into a chunk of peanut brittle.

At Pat's Gourmet LLC, named after Lodish's mother, Lodish calls himself the COE: chief operating officer of

For more great business stories in our Pro-Files series, check out both Fortune.com and SI.com.

PHOTOGRAPH BY NICK HAGEN

everything. He wears every hat there is: overseeing the books with his accountant, making sure operations run smoothly, being director of sales. And he aims to elevate Pat's from regional business to national brand. "Launching a small business is much tougher" than playing football, Lodish says. "I've gotten my MBA essentially by doing this."

Lodish, 47, is best known as a walking, talking answer to a trivia question: He was the first to play in six Super Bowls (a record that quarterback Tom Brady tied this year). Lodish won two of those games with the Denver Broncos, after the 1997 and 1998 seasons, having lost four with the Buffalo Bills. If his name doesn't ring a bell, that's not surprising: Lodish, an all-conference defensive tackle at UCLA, was undersize for his position in the pros and spent most of his NFL career as a backup. "I was a drone in the beehive," he says.

After retiring in 2000 and completing his college degree—with a minor in business administration—Lodish went home to Michigan and tried a few different careers. He got the inspiration for his peanut-brittle path when he saw a commercial for LegalZoom, a company that helps small businesses with legal paperwork; the ad featured Janet Long, a fellow UCLA alum who brought her mother's toffee recipe to market.

To succeed in the food business, you have to offer something unique, and Lodish believed he had that in his mother's brittle, from a family recipe going back several generations. (Pat Lodish estimates she's been making it for nearly half a century.) The brittle was also a tribute to Pat, whom Lodish credits with imparting his work ethic. "I was a champion in football, and my mom is my champion in life," he says.

Pat's nickname, tellingly, is General Patton. "I like to be accountable for my actions," she says, "and I try to instill that in my children." That sometimes meant curbing Mike's entrepreneurial drive. His first love was hockey, and his father, an oncological surgeon, would give him rolls of medical tape to use for his ankles and shin guards. At age 10 or 11, Lodish built a side business selling tape to teammates who'd forgotten theirs; he was busted after a well-meaning hockey mom came to Pat and thanked her. "I made him give back their money, every penny of it," Pat says.

Lodish won two Super Bowls with Denver, after losing four with Buffalo.

"That was probably the start of my entrepreneurial endeavors," Lodish says with a grin. These days, those endeavors win Pat's approval: His brittle, available in three flavors, is stocked regionally in about 30 metro Detroit specialty food stores, including local Whole Foods stores.

Getting it there wasn't easy. Lodish launched the company in September 2011 with an initial investment of $16,000; it took 14 months to get the product to market. He started by doing market research, sampling 150 other recipes, but decided none could improve on his mother's. Pat's product is lighter than typical brittle, with air bubbles that give it a satisfying crunch. That, Lodish says, is a function of the precise time and the temperature at which it is cooked, both of which are top secret. Factory visitors (including reporters) are required to turn away at crucial points in production.

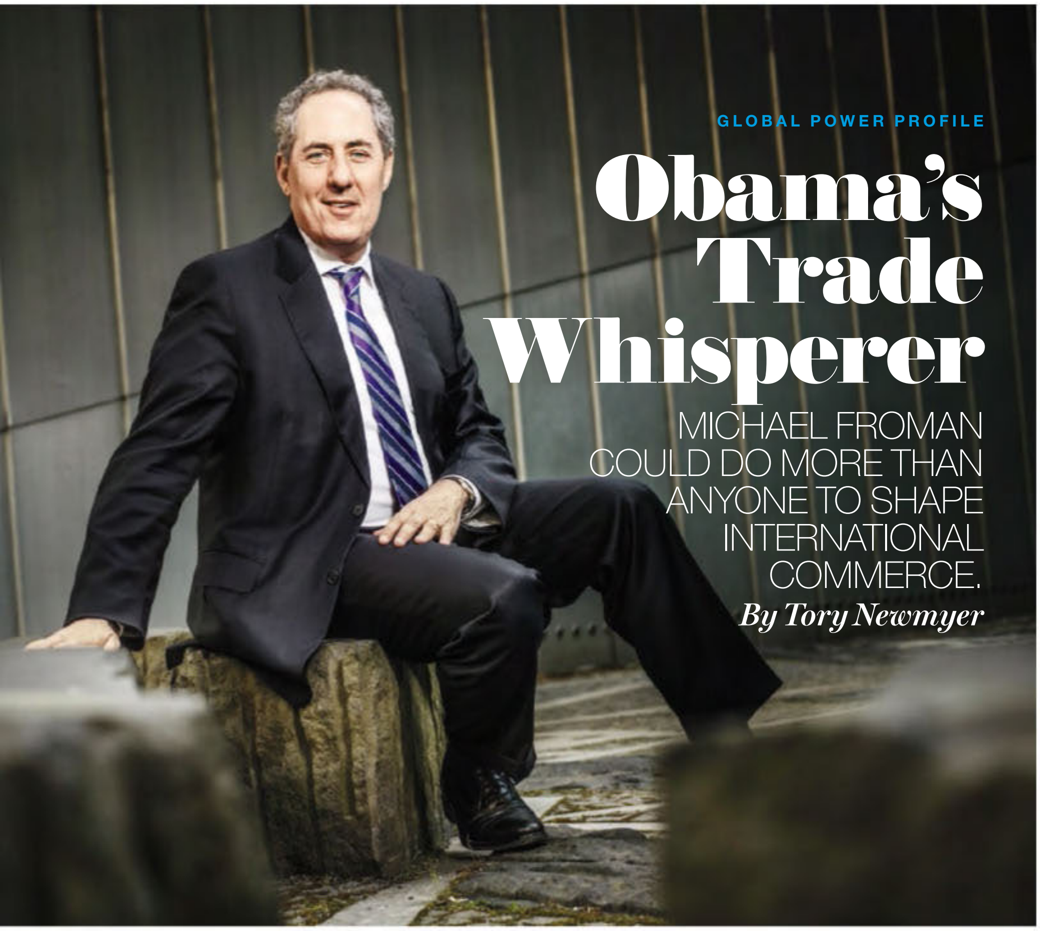
But Lodish also realized his product was highly marketable as a locally made, relatively health-conscious treat. The recipe is vegan—no butter or dairy—and gluten-free. And Lodish's football fame gave the product a built-in local appeal.

"LOSING FOUR SUPER BOWLS TAUGHT ME TO SAY, 'YOU KNOW WHAT? DON'T EVER GIVE UP, KEEP GOING, THERE'S ALWAYS ANOTHER DAY TOMORROW.'"
—Mike Lodish

The company makes a profit, says Lodish, and volume has almost doubled since the brittle's debut, with the company selling 700 to 1,000 pounds a week (at $7 a pound). But for now, though he's the sole full-time employee, Lodish doesn't pay himself a salary; he's living off savings and a side job while he plows his gains back into the business. He's hoping a bigger company will invest in the brand and expand it nationwide.

In the meantime, he's learned a lot of lessons—especially about salesmanship. "Once I get in front of somebody face-to-face, I can pretty much close 'em," Lodish says. Spiro Liras, who runs the Warren manufacturing facility, says of Lodish, "He's very witty, very quick on his feet ... beating on people's doors and getting [the brittle] on the shelves."

Lodish credits athletics with giving him the discipline to be an entrepreneur. But he has found his Super Bowl losses to be as important as the wins. "You need the disappointment in order to teach you and to test your resolve," he says. "Losing four Super Bowls taught me to say, 'You know what? Don't ever give up, keep going, there's always another day tomorrow.'"



GLOBAL POWER PROFILE

Obama's Trade Whisperer

MICHAEL FROMAN COULD DO MORE THAN ANYONE TO SHAPE INTERNATIONAL COMMERCE.

By Tory Newmyer

THINK BACK TO THE 2012 PRESIDENTIAL campaign, and it would be tough to imagine President Obama pursuing a massive trade agreement as his top second-term priority. Yet it's where Obama finds himself with 18 months left in office: pushing alongside congressional Republicans and powerful corporate interests to wrap up a 12-nation pact linking Pacific Rim markets from Japan to Chile. And he's winning. For that, much of the credit (or blame, depending on your side in this explosive debate) belongs to Michael Froman.

Obama's longtime colleague is a key architect of the Trans-Pacific Partnership, a deal that could shape the President's legacy and remake global trade.

Sitting in his office near the White House in mid-July, fresh off a flight from Malaysia, Obama's chief trade negotiator toed a cautious line. "We're taking nothing for granted," said a shirtsleeved Froman. And with good reason. The deal itself is diabolically complex, interweaving nearly $28 trillion in economic activity into a new order that will seek to ease the flow of trucks, pills, beef, and other goods across an ocean while also rewriting rules for everything from copyright protections to labor standards. Selling it to a skeptical American audience presents another challenge altogether.

As U.S. Trade Representative, Froman, 52, should occupy an outer orbit in Obama's cabinet. But he claims longer-lasting ties to the President than anybody else in the administration—back to Harvard Law, where the two worked on the law review. Froman went on to serve as then-Treasury Secretary Robert Rubin's chief of staff in the Clinton administration and followed Rubin to Citigroup. When Obama first emerged on the national scene, it was Froman who introduced him to the Wall Street donor network, and Obama has kept him close in a variety of roles ever since.

In the White House, Froman started as a chorus of one for an aggressive trade agenda. A trip to Korea with Obama in fall 2010 kicked off a running discussion with the President about the need for the U.S. to forge tighter economic ties in the region, in part to check a rising China. "He's the intellectual author of the approach," says Tom Donilon, Obama's former National Security Adviser. "He saw the strategic implications." Internally, Froman deemphasized any immediate jobs boon from a trade deal, understanding that NAFTA's failure to deliver on that score still haunts Democrats. But as more countries joined the talks, culminating with Japan in 2013, resistance within the administration melted away.

Democrats on Capitol Hill have proved a lot tougher. Twice this spring and summer, they nearly derailed the administration's push for fast-track authority to finalize negotiations on the pact. Froman's office has conducted nearly 1,700 Hill briefings—including 200 by Froman personally—and managed to peel off fewer than a fifth of congressional Democrats. But that was enough to keep the process moving: Froman and his team are now crisscrossing hemispheres to iron out the last bumps in the accord, aiming for a late-summer finish. And then, once again, he'll have to face friendly fire on the Hill. "We're going to talk to anybody who's willing to talk to us about the substance," Froman says. He's had plenty of practice.

DOMINIK BUTZMANN—LAIF/REDUX

The Global Mobile Economy

CONNECTIVITY IS KING AS THE ADVENT OF 5G NEARS AND **WIRELESS DEVICES** PROLIFERATE WITH NO END IN SIGHT.

WATCH A MOVIE ON YOUR phone? Turn your bedroom lights on from across the country? Check in to your flight using your smartphone?

Wireless has transformed people's lives worldwide, rendering the smartphone into a remote control device for your personal world from stereo to security system. "The growth of demand for data is extraordinary," says Jonathan Adelstein, president and CEO of PCIA, the trade association for the wireless infrastructure industry. "It's not just changing the face of wireless, but every other industry, as well."

Indeed global mobile data traffic grew 69% last year (Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update 2014–2019). The five-year global outlook calls for traffic to increase tenfold by 2019. In the Middle East and Africa, annual growth is expected to hit 72%, followed closely by Central and Eastern Europe, at 71%.

The Cisco report cites the proliferation of mobile-connected devices as a key factor. Already the number of devices exceeds the world's population, with almost half a billion devices and connections added in 2014 alone. Connection speeds are accelerating, data demand per smartphone is rising, and video now accounts for more than 50% of all mobile data traffic.

Such statistics indicate both the remarkable opportunities and the real challenges faced by the wireless industry. Among the challenges is the fact that the radio spectrum is a finite resource. As a result, wireless carriers are aggressively seeking to acquire frequency real estate. In January, for example, the FCC raised a record $41.3 billion when it auctioned off a slice of coveted airwaves to eager bidders.

To make the most use of existing spectrum holdings, companies are expanding wireless infrastructure and creating more efficient access systems. That's added up to an industry investment of more than $35 billion a year, an amount that the PCIA says is greater than that made by any other industry.

PCIA
The Wireless Infrastructure Association

The end user probably has little awareness of these expensive technological improvements. "People today just expect everything to be wireless and for it to work," says Adelstein. But there is great demand for new apps like streaming video (or music) and health care monitoring.

Additionally, machine-to-machine applications are providing connections to devices ranging from vending machines and thermostats to heart monitors, and the Internet of Things is growing fast. Wearables are moving beyond exercise monitors to smart hearing aids and diabetes trackers that log insulin levels. Plus consumers are expecting faster connections and greater capacity. All of this is prompting major changes in the wireless sector.

Just ask AT&T. "We are in the process of becoming a fundamentally different company, one focused keenly on software and video," says Andre Fuetsch, AT&T's senior vice president-domain 2.0 architecture and design. This shift represents recognition of the increasing role wireless communications are playing in connecting people, machines, and things in new and dif-

> "People today just expect everything to be wireless."
>
> **JONATHAN ADELSTEIN,**
> President and CEO, PCIA

ferent ways, with video now accounting for more than 50% of the traffic on the AT&T network.

"The connected life is becoming a central part of our company's mission to mobilize people's lives," he says.

Anticipating massive growth in traffic on its network, AT&T is creating a new ecosystem that uses software to replace expensive custom hardware with faster, more adaptable, and more cost-effective systems.

By 2020, the company plans to virtualize 75% of its network, replacing hardware with software-defined architecture and cloud-based infrastructure, says Fuetsch, noting that 5% is on target to be virtualized by the end of the year.

"Less than a decade ago, development cycle times were measured in years," he says. "Today they are measured in months or even weeks." That's translating into more customized wireless service. One example: AT&T's new Network on Demand now allows customers to adjust network bandwidth so they can use just what they need when they need it.

The network itself is getting more complex, as companies augment cell towers with other technologies. Distributed antenna systems, small cells, and WiFi hotspots are now used to create heterogeneous networks, or HetNets. These are typically used to provide service to specific areas, such as large venues like stadiums, buildings, or developments.

"Instead of continuing to put up giant towers that look like the world's ugliest pine tree, you can put in a small cell, which is about the size of a pizza box or a smoke detector," says Leighton Carroll, CEO of Squan, a wireless ecosystem company founded in 2008 that specializes in HetNet solutions.

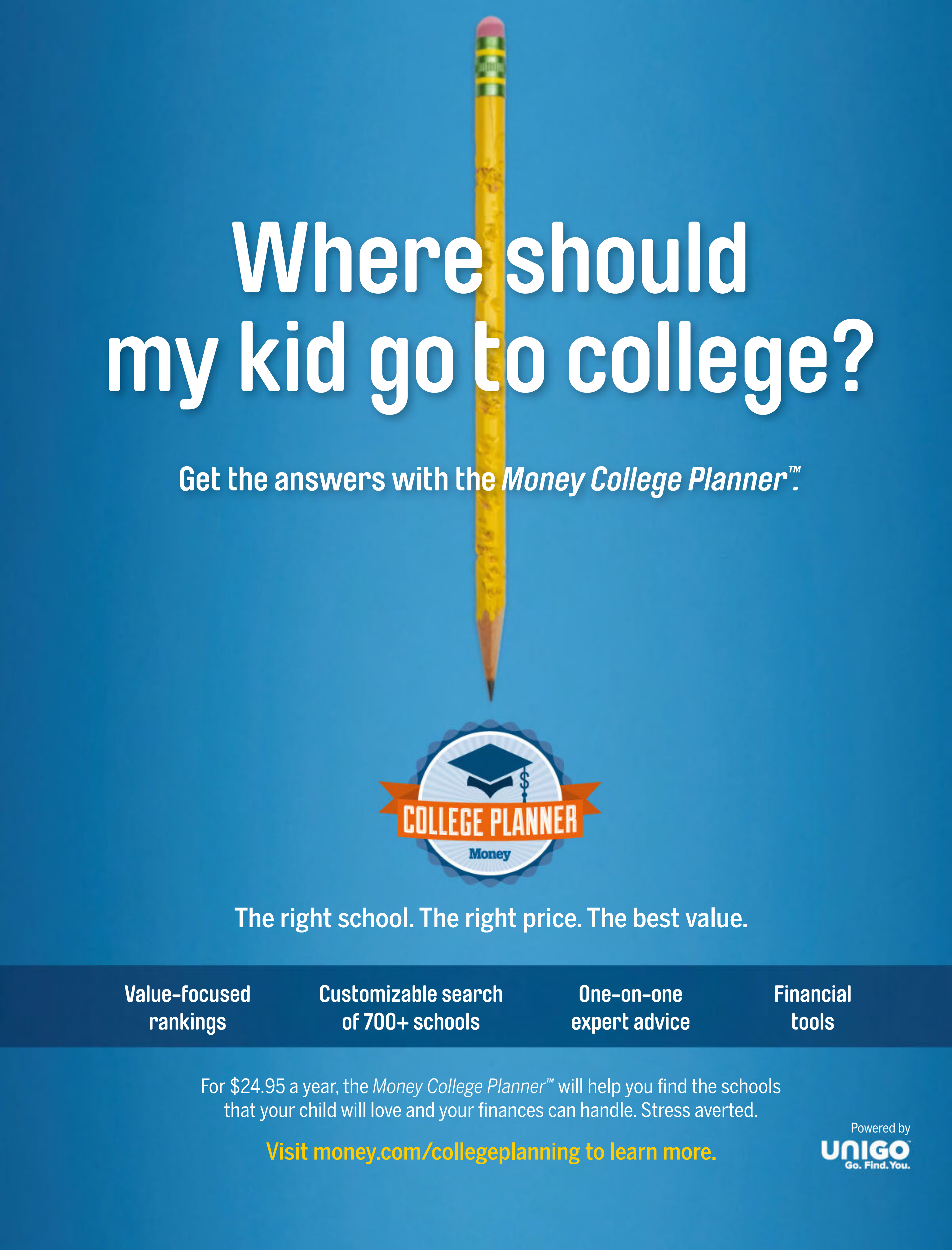
The idea, he says, is to combine multiple radio assets through engineering and software so that they together provide seamless service. "That effectively increases the capacity of wireless networks, using a much smaller footprint."

But what does all this mean to the consumer?

Connectivity is expanding. The industry is eyeing rural America, recognizing that there are millions of potential customers who still do not have access to mobile wireless broadband. The potential is even greater in Africa, where wireless technology is being used to promote mobile financial services and fuel business development.

The wireless industry is already positioning itself for the arrival of 5G, the next generation of wireless, expected to roll out by 2020. Pundits say the arrival of this faster, vaster, and more robust network will lead to remarkable advances. The possibilities range from self-driving cars that talk to each other to avoid accidents, to surgery performed by a robot controlled by a distant doctor.

"Even though we can't really imagine the future, we are on the cusp of major changes," says Tim House, executive vice president of PCIA. "To people in this industry, that's what makes every day exciting."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HOW I GOT STARTED

Crail at a Rocky Mountain Chocolate Factory shop in Commerce, Calif.

TAKING FUDGE TO A NEW PEAK

FRANK CRAIL opened up a shop called the Rocky Mountain Chocolate Factory to make friends—and happened into an international candy empire.

Interview by Dinah Eng

FRANK CRAIL WAS RUNNING *a successful tech business when he and his wife decided to start a family in the small town of Durango, Colo., in 1981. Since there was no candy store there, Crail, now 73, borrowed $50,000 to start the Rocky Mountain Chocolate Factory—and then stumbled into making his signature product. Despite being undercapitalized—and at one point unable to pay suppliers—he built the company into an international brand. Last year it had $41.5 million in annual revenue, and 341 franchises in the U.S., Canada, Asia, and the Middle East. Crail's story:*

I have a sweet tooth, but I never intended to go into the confectionery business. Most of my childhood was spent in San Diego, where my mother worked in retail and my father was a parts buyer for an aerospace company.

After two years of college I joined the U.S. Army during the start of the Vietnam

PHOTOGRAPH BY MATHEW SCOTT

War. I ended up in Okinawa, in an Army intelligence unit. A few years later I went to work in the CIA's computer department in Washington, D.C. Then in 1972 a partner and I launched CNI Data Processing, which specialized in billing systems for the cable-TV industry.

My wife and I were living in San Diego when we came across Durango, which had a population of 12,000. We liked the idea of raising a family in a small town, and I thought it'd be nice to start a business to get to know people. The local consensus was that Durango needed a car wash, which didn't appeal to me. Then one guy said we could use a candy store. I did some research and thought if I could do five months of good business with tourists and three months with the locals over the winter holidays, maybe candy would work.

I was not rich from selling my interest in CNI. I was taking out $6,000 a month from the company, which gave me time to feed the family and start the candy store. Two of my friends, Jim Hilton and Mark Lipinski, decided to go in with me. I put a second mortgage on my house and borrowed $50,000 to start the Rocky Mountain Chocolate Factory.

Durango is famous for the Durango & Silverton Narrow Gauge Railroad, and I wanted the store to be close to the train station. I found a place and paid $30,000 to buy the lease. It paid for itself many times over, but spending $30,000 of our $50,000 capital put a lot of pressure on us right away.

I wanted to make fudge on a marble table to entertain and keep people in the store. So we ended up finding marble slabs in junkyards, cleaned them up, and used them for our tables. We got antique scales for ambiance. We then arranged to buy chocolate from a candymaker in San Diego named Everett Seeley.

It was 1981 when my wife and I moved to Durango. Jim was going to drive the marble and chocolate up in time to open on the Saturday of Memorial Day weekend. He showed up at 9:30 p.m. Friday night, after getting a flat tire. We got everything set up that night, but the next morning we overslept. By the time we got to the store, it was 9 a.m. We were in such a hurry, we forgot the chocolate. Jim, who came up with all the recipes for the fudge we originally sold, had never cooked more than six pounds of fudge at a time, and never at a high altitude, which affects the outcome. So he went to work making 22 pounds of fudge on a gas stove while I tried to figure out how to work the cash register.

We had a good time that day talking and laughing with people. They'd ask if we did mail orders, and we said, "Yes, of course." That first day we got 20 fudge orders for cappuccino, black forest, rum raisin, and other flavors. Jim figured out how to make them all.

At the end of the day we sold out of fudge and made $850. The next day was pretty much the same, and we had the chocolate to sell too. That was our start.

Without refrigerated delivery to Durango, I knew we would eventually have to start making the chocolate ourselves. When Everett retired, I talked him into coming out to teach us how to do it.

We needed a cool place to work, and one of our employees lived in an apartment with a basement. So one day I went there to melt chocolate to make turtles. We had mixed the caramel and pecans in the store, and the size was accidentally five to six times larger than a normal chocolate turtle. We dipped them in chocolate anyway. Minding every penny, I said, "We're not going to throw them out or eat them. We're going to sell them." We sold out in a couple of hours. So I decided to make all the chocolate oversize. That mistake turned into our brand. At the end of the first year the store did $180,000 in sales.

We had spent more than the remaining $20,000 initial capital on equipment and inventory, so we were always behind. I didn't know enough to be afraid.

We opened three other stores and decided to franchise. We knew nothing about franchising and had no money for the infrastructure, but decided to do it anyway. In 1982, Jim went back to teaching, so I bought his interest. Mark and his wife didn't want to live in Durango, so I bought his interest too.

We were always undercapitalized, and there were times I'd wake up at 2 a.m. wondering how I was going to make payroll. At one point I had to call every supplier to tell them we didn't have the money to pay their invoices. People understood, and no one asked to be repaid right away.

As long as you're in business for another day, you don't give up. You have to continue to fight. From a financial standpoint, it took almost 20 years before we were on solid ground. We went public in 1986, and in 2013, I added U-Swirl Frozen Yogurt to the company.

It takes a little luck, a lot of perseverance, and a great team to sustain and grow a business. I've been very fortunate to see this business go from one store to an international brand.

MY ADVICE

FRANK CRAIL
CEO, Rocky Mountain Chocolate Factory

MAKE THE HARDEST CALLS FIRST THING IN THE MORNING. That way you don't keep putting them off.

NEVER SACRIFICE FAMILY TIME FOR YOUR BUSINESS. You can work as many hours as you want in business, but you can't earn back the time lost with your spouse and kids.

PRAY FOR THE WISDOM TO DO THE RIGHT THINGS, NOT FOR A SUCCESSFUL BUSINESS. If you do the right things for the right reasons, it might work out. And if not, you'll find your success somewhere else. But always do the right thing.

Staff at a grocery store in Elk Grove, Calif., strike a pose

A RETAIL GIG THAT EMPLOYEES DON'T HATE

Nugget Market inspires devotion in its workforce with plenty of training opportunities. The pay doesn't hurt either. *By Claire Zillman*

KRISTEN PATCHETT was a teacher's aide in Northern California five years ago when she took a part-time job at Nugget Market to fill her free afternoons. Between then and now she left teaching, received three promotions, and became the manager-in-charge of the grocery chain's West Sacramento store. When she graduated from the company's intensive leadership program in 2013, she got emotional. "You've been trusted with knowing so much about the store," she recalls thinking. Not bad for someone who had been bagging groceries three years earlier.

Extensive training for employees and bringing workers into the family fold are signatures of the West Coast grocery chain, whose brands include Nugget Markets, helping land it on *Fortune*'s 100 Best Companies to Work For ranking every year since 2006. The company, which got its name from a 10-year-old who won a naming competition in 1926, is currently run by the fourth generation of the Stille family (the fifth is working its way up the ranks).

Nugget Market workers received between 40 and 140 hours of training last year. Because of that investment and its legacy, company executives take HR seriously. "We hire the attitude," CEO Eric Stille says. "We'll teach you the grocery business." Last year the company waded through applications from 10,400 people for 273 spots. New employees who aren't up to par are notified and coached on what to fix. "If there isn't an improvement, we'll be parting ways," Stille says.

If that seems excessive, consider the duties of a Nugget Market entry-level worker. Clerks not only bag groceries but also escort customers to their cars, bale cardboard, corral shopping carts, and complete hourly safety sweeps of a store's aisles. Stille says the heightened attention to detail is what sets the company apart from the ever-increasing competition and helped it grow same-store sales 5% year over year.

In exchange for asking a lot of its employees, Nugget Market pays well. The company's checkers—a step up from a courtesy clerk—earn an average of $17.53 per hour, compared with $10.37 for grocery cashiers nationally. Store directors earn $98,500 per year on average, with potential for up to $15,000 in bonuses and overtime. Nationally, grocery store managers earn about $82,790. And any employee who works at least 22 hours a week is eligible for health insurance. The company pays 100% of premiums.

Plus, there's a chance for personal triumph. The most anticipated event of the year at Nugget Market is the Bag-Off, a raucous companywide tournament in which employees stuff food into grocery bags as fast as they possibly can. Jeremy Jones, who works at a store in Davis and judges the competition, concedes that the event is "off the hook crazy." But it, too, is a development opportunity: "When we're judging, we say, 'This is great, but I would do it this way.'" Even bagging improves with training.

100 BEST COMPANIES TO WORK FOR

No. 26

Headquarters
Woodland, Calif.

Revenues
$275 million

Perk
If Nugget Market associates shop where they work, they get 10% off.

COURTESY OF NUGGET MARKET

5 Ways to Tap Nature to Build a Better Business

BRINGING THE OUTSIDE WORLD TO THE OFFICE CAN HAVE MANY BENEFITS.

By Verne Harnish

LOWER YOUR HEALTH COSTS

After Summit Technical Solutions moved in January from a downtown office to new headquarters in Colorado Springs, the defense and space industry contractor organized a monthlong fitness challenge. Participants who walk $1\frac{1}{2}$ miles on a trail and do exercises alongside a scenic stream next door get to wear workout gear to the office on those days as an incentive. This challenge and others are having an impact. “Our prescription-drug costs have gone down, and wellness visits to the doctor have gone up,” says Kelly Terrien, Summit’s CEO.

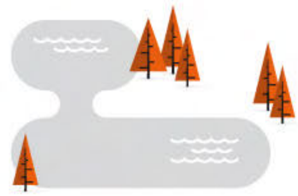
USE BIOMIMICRY IN OFFICE DESIGN

It’s no surprise that Frank Gehry incorporated the outdoors throughout Facebook’s headquarters, from skylights to a rooftop garden. Research shows that bringing the outdoor environment into the workplace lowers employees’ stress, while sunlight improves creativity. Smaller firms can do the same thing. At Summit, which has some 420 employees and $27 million in annual revenue, glass walls offer a view of Pikes Peak for every employee to enjoy. “People seem a lot more motivated,” says Terrien.

[redacted]

TRY NEW ORGANIZATIONAL STRUCTURES

Steven Johnson was ahead of his time when he wrote *Emergence: The Connected Lives of Ants, Brains, Cities, and Software.* As he pointed out, ant colonies and beehives don’t have a lot of organizational structure. Neither should your company. If you let your teams self-organize without heavy layers of management, they’ll innovate more—which will make your company grow faster. This is precisely what the award-winning gaming-software company Valve is doing and what W.L. Gore, maker of Gore-Tex fabrics, has practiced for decades.



CLEAR AIR, CLEAR MIND

When Anne-Marie Faiola needs to make tough decisions as CEO of soap-making supplier Bramble Berry, she takes long runs through the woods at Lake Padden Park, near her office in Bellingham, Wash., to reconnect with nature. That approach gave her clarity recently when she was trying to decide what to do with an ailing business unit at the firm, which has about $14 million in annual revenue. “I was able to come up with a concrete plan of action,” she says, “to sell the struggling unit off.”

ADAPT TO SURVIVE

Ask Rachel Ross, VP of Mandala Homes in British Columbia, about Charles Darwin’s axiom. After the recession struck, Mandala shifted emphasis from 3,000-square-foot circular, prefab houses and commercial buildings to models as small as 600 square feet, which more customers could afford. “We were able to survive where a lot of other homebuilders didn’t,” says Ross. And by 2013 the 14-employee firm was able to pivot back to selling larger homes.

VERNE HARNISH IS THE AUTHOR OF *SCALING UP*.

ILLUSTRATIONS BY MARTÍN LAKSMAN

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PASSION.
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WITH UNLIMITED CASH BACK?
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Tech

THE AGE OF UNICORNS

By Leena Rao

Patrick Collison, right, with his brother and business partner John

A BILLION-DOLLAR STARTUP EARNS ITS STRIPES

Apple, Facebook, Salesforce, Sony—San Francisco payments startup STRIPE is racking up big partners. But don't count out rival PayPal just yet.

PATRICK COLLISON never answers his phone when the caller ID says it's an unknown number. The exercise is always a waste of time: a telemarketer, a wrong number, *something*. But less than a week before Christmas last year, while he was on vacation in his native Ireland, Collison's phone buzzed, and he felt the unusual urge to tap "answer."

Hi, Patrick? It was a man's voice, nasal in tone. *This is Michael Lynton.* Scrambling from what this magazine

PHOTOGRAPH BY GABRIELA HASBUN

recently dubbed the "Hack of the Century," the CEO of Sony Entertainment was in search of a way to distribute *The Interview*, the controversial film at its center. Lynton needed a payments infrastructure that could be deployed quickly and withstand the wrath of the hackers who had already embarrassed his company. Stunned, Collison was all too pleased to help.

Stripe, the five-year-old startup that Collison co-leads with his younger brother John, was an unusual choice for a Japanese conglomerate in search of stability. The San Francisco company had struck deals with ascendant neighbors like Facebook, Pinterest, and Twitter. A Global 500 giant like Sony—let alone one reeling from catastrophe—was a far different endeavor.

But new partnerships with some of the world's largest companies suggest that Stripe is finally growing into its potential. In the last year the brothers Collison have signed deals with Alibaba (to support Alipay), Apple (Apple Pay), and American Express (Amex Express Checkout).

"We wanted to do the Alipay deal and the Twitter partnership three years ago, but we weren't there yet," Collison says. "Now we are."

Core to Stripe's appeal is technology that promises to be simpler and sturdier than the byzantine systems that most online businesses use to process payments. With a few lines of code that take minutes to set up, web and app merchants can accept more than 100 global currencies, including Bitcoin, for a fee of 2.9% plus 30¢ per transaction.

The effortless nature of Stripe's technology helped attract big early investment in the company—Sequoia Capital partner Michael Moritz and former PayPal CEO Peter Thiel are among those who have contributed to the startup's $200 million war chest—and even bigger expectations. (Discussing payments with Patrick Collison in 2011 "was like when I talked to Mark Zuckerberg about social networking in 2004," Thiel says.) Today, Stripe counts Facebook's CEO and Salesforce CEO Marc Benioff as advisers and is now valued at $5 billion, enough to merit a spot on *Fortune*'s Unicorn List.

BRAINSTORM TECH 2015

Catch Patrick and John Collison's interview from our annual summit at fortune.com/bststripe.

All are steps toward building what could be the next PayPal—but the biggest hurdle may be the $45 billion company in question. PayPal's Braintree subsidiary poses stiff competition by winning lucrative contracts with highflying startups like Uber and Airbnb. Braintree processed nearly $23 billion in 2014; sources close to Stripe say that it is currently processing about the same amount but growing faster. Keith Rabois, a Silicon Valley investor and early PayPal employee who backed Stripe in 2014, says only that Stripe is processing "tens of billions of dollars per year."

The race is on—especially overseas. This year Stripe plans to expand to Hong Kong, Japan, New Zealand, and Singapore; India and China are further down the road. (Of those, Braintree already operates in Hong Kong and New Zealand.) Stripe hopes that its rapid expansion beyond its home market will position it to better compete for business from fast-growing, billion-dollar e-commerce startups like Flipkart and Snapdeal.

And then there's the matter of fending off acquirers that could stifle ideas and slow the young company's momentum. Sources close to the companies say PayPal tried to acquire Stripe in 2013; the brothers turned it down. Facebook also tried to buy Stripe in the past two years; sources say the Collisons gave Zuckerberg the same answer. (Stripe declined to comment.)

For now, independent growth suits Patrick and John just fine. "PayPal is a cautionary tale for us," says the younger Collison. "It was acquired in 2002 and hasn't done anything innovative since then."

THE UNICORN LIST: ADDITIONS AND UPGRADES

23andMe
The genetic analytics company known for turning a saliva sample into a fascinating climb through the family tree recently raised $79 million at a valuation of $1 billion. Its next step? Tapping its massive DNA database to make new drugs.

Palantir
The secretive data analytics firm (which counts the FBI and CIA as clients) is reportedly raising up to $500 million at a $20 billion valuation. Why? To further expand into industries like banking, insurance, energy, and consumer products.

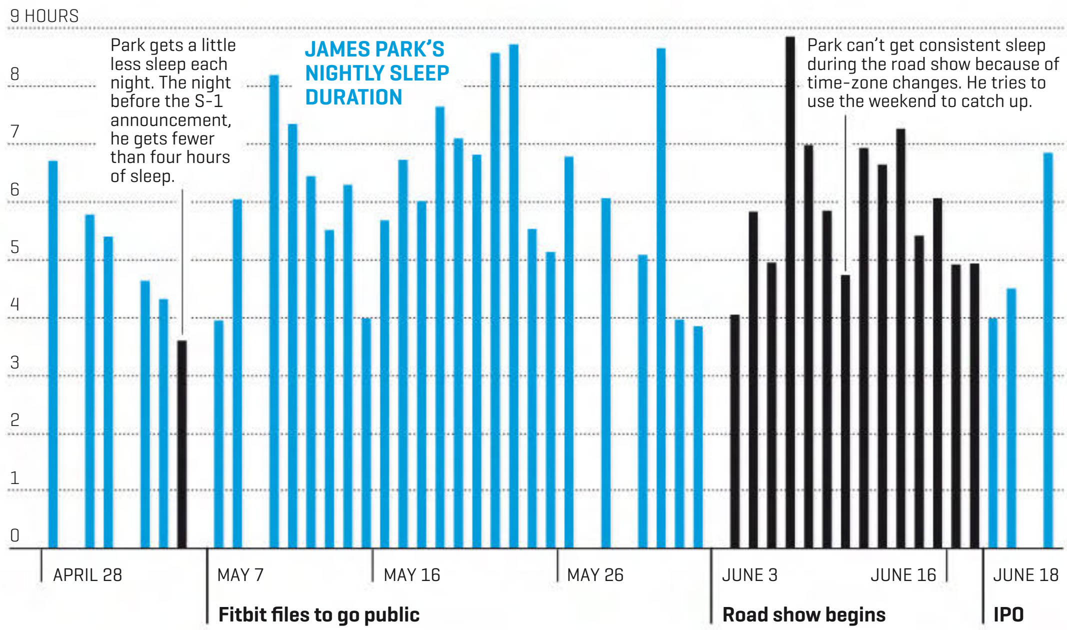
GrabTaxi
Think there's money in the ride-hailing business? Singapore's answer to Uber just raised $200 million, valuing it at $1.5 billion. It's a crowded market: China's Didi Kuaidi and India's Ola, not to mention Uber, are poised for a fight.
—*Andrew Nusca*

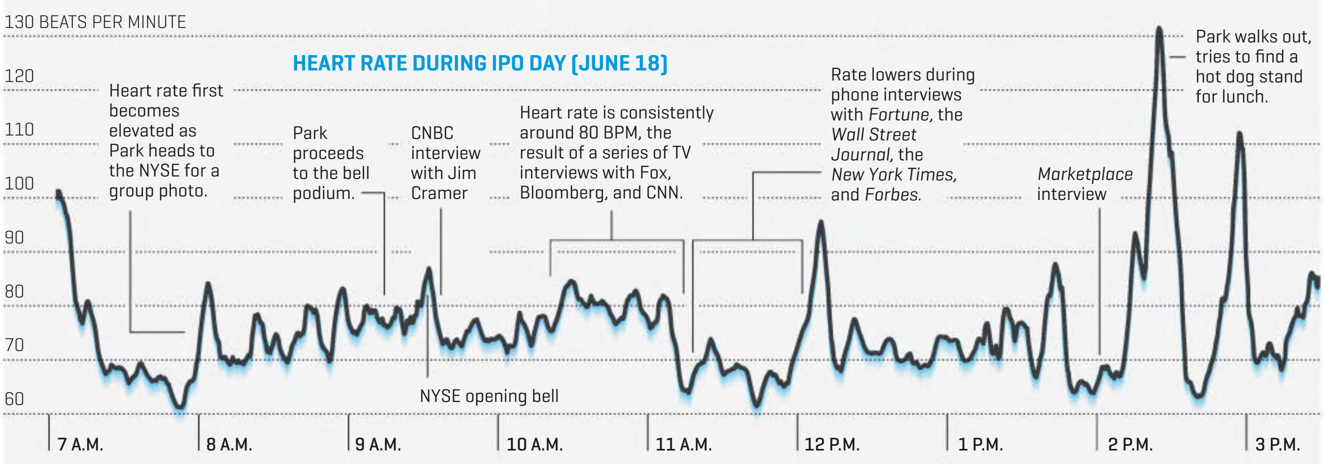
ICONS: MARTÍN LAKSMAN

THE QUANTIFIED SELF: CEO-AT-IPO EDITION

It's rare to spot Fitbit CEO **JAMES PARK** without one of his company's fitness trackers strapped to his wrist. So how did he fare ahead of the June 18 IPO? We asked him to share the data. ***By Jason Cipriani***

JAMES PARK'S heart rate and sleep patterns tell the real story of what it's like to be the chief executive of a company about to go public. Park wore Fitbit's Surge "super-watch" during the entire process, from the company's initial SEC filing through the subsequent road show and finally to his IPO-day celebration with a New York–style hot dog. Even Jim Cramer couldn't get a rise out of him. Here's a look at the numbers.





JAMES PARK'S TIPS FOR MANAGING IPO STRESS

- **STAY FOCUSED** on a specific goal. (Even if it's a hot dog.)
- **BE PREPARED.** "We had almost 100 meetings with investors."
- **GET A CONSISTENT** amount of sleep every night. "Data is helpful to maintain discipline."
- **STAY FIT.** "Health is an important part of managing the ups and downs of running a company."

PARK: RICHARD DREW—AP; GRAPHIC SOURCE: FITBIT

IT introduces self-resolution IT

The new MyIT app enables employees to self-resolve tech issues via crowdsourced collaboration, reducing service desk calls by up to 92%.

Bring IT to Life at bmc.com/TryMyIT

bmc MyIT *for* Employee Productivity

Marc Andreessen mentions Meredith Perry in the same breath as Nikola Tesla and Elon Musk—citizens of "the Harry Potter world."

IS THIS WOMAN THE NEXT ELON MUSK?

Her critics say she's pursuing an impossible idea. But for MEREDITH PERRY, the ambitious co-founder and CEO of uBeam, wireless charging at a distance is the real deal. ***By Daniel Roberts***

MARK CUBAN CALLS IT A "ZILLION-DOLLAR IDEA." He invested without ever seeing a prototype. Marc Andreessen, Shawn Fanning, and Tony Hsieh invested too. Marissa Mayer chose to invest after spending 15 minutes with the inventor.

The idea? Charge the battery of an electronic device from across the room—no wires necessary. The company is uBeam, based in Santa Monica. And the 25-year-old woman behind it all is Meredith Perry, its brilliant, ambitious, and occasionally overwhelming co-founder and CEO.

Perry grabbed the world's attention after demonstrating the concept with co-founder Nora Dweck at a conference in 2011. Using ultrasound waves, the pair beamed a small amount of power between two toaster-size boxes positioned a few feet apart. Reaction was mixed: TechCrunch founder Michael Arrington called it "the closest thing to magic I've seen." A physicist wrote that "it's an impossible idea" that would cause bodily harm. Through it all, Perry tinkered without producing a commercial product.

In late 2014, uBeam—flush after raising $10 million from investors—announced that it had finalized a working prototype. "There may be people on the Internet who don't believe it's true," Perry says. But those who see it "are converted instantly." (She declined to show the prototype to *Fortune*.)

One day, Perry insists, uBeam will be in bars, libraries, and industrial warehouses. Doubts about the concept make her happy because it means there is little competition.

Perry, who comes from a family of scientists—her father is a plastic surgeon who developed a line of cosmetics; her mother is a child psychologist—continues the tradition. In the third grade she invented a pair of reading glasses with lightbulbs on them. In the fourth grade she developed a robot to carry firewood. In the fifth grade she cultured bacteria from her mouth and a dog's to see which was cleaner.

Today, Perry buzzes with blinding frequency. She talks a mile a minute and has difficulty remembering what she did the day before. "I have the memory of a gnat," she laments, a product of her many meetings as uBeam works to prove critics wrong.

Andreessen, who has seen uBeam's technology firsthand, calls the skepticism "highly unfounded." "This will be the mother of all markets when it comes together."

PHOTOGRAPH BY DAMON CASAREZ

WELCOME TO MY (SMART) HOUSE

There are more connected home gadgets to install than ever before, from locks to switches to speakers. What's worth the trouble? We asked *Fortune* editor STACEY HIGGINBOTHAM what's in her house. Quite a bit, it turns out.

THE ESSENTIALS

1. Curb energy-monitoring device
WHERE: Inside circuit-breaker panel in garage; outside house
WHY: "It's the smartest way to start because it gives you real-time energy consumption data for your entire home. An instant money saver."

2. Ecobee 3 smart thermostat
WHERE: In upstairs and downstairs hallways
WHY: "It's another major system. It's programmable and saves money. And it cools the room you're in as opposed to where the device is installed."

3. Sonos wireless speaker system
WHERE: Kitchen, living room, bedrooms, bathrooms, rooftop deck
WHY: "If you like music, this wireless system is immersive. Play anything anywhere."

4. Philips Hue smart lightbulbs
WHERE: Throughout the house
WHY: "LEDs save money, and they can change colors to mimic a sunrise or sunset. I programmed them so that when my boss sent me a text message, they all turned red."

NICE TO HAVE

5. Amazon Echo
WHERE: Kitchen
WHY: "You can talk to it and control your Hue lights. My family asks it questions: 'How long is *The Land Before Time*? Where can I stream it from?' We use it all the time at dinner so that we don't have to pull out our smartphones."

6. SmartThings system
WHERE: In a closet underneath the stairs
WHY: "It allows true systemic automation. And you can set rules. I have one sensor on my second-floor washing machine to ensure that it's not leaking and damaging the house."

7. Chamberlain garage-door opener
WHERE: Garage
WHY: "This one is pretty straightforward. I can see if my garage door is open or closed from anywhere in the world using an app on my smartphone. With one swipe of my finger, I can open or close it. Pretty cool."

8. Belkin WeMo switch
WHERE: Bathrooms, kitchen
WHY: "This is a Wi-Fi-connected electrical outlet. It's useful for controlling the humidifier in a child's bedroom—you can turn it on and off with your phone—or appliances like a curling iron or coffeemaker."

FOR DIEHARDS ONLY

9. Jawbone Up3 fitness band
WHERE: On the wrist of the homeowner
WHY: "Counterintuitive to choose this, I know. But you can link it to your house, and that's where it gets interesting. You can integrate with SmartThings so that when you wake up it will turn on the downstairs lights and start brewing coffee. I look at it as a personal trigger."

10. Kwikset Z-Wave locks
WHERE: Outside doors
WHY: "Lock and unlock doors with the tap of a finger. What more is there to say?"

11. Lutron dimmer light switches
WHERE: Dining room, entrance hallway
WHY: "They work amazingly well. I replaced two switches in my house with these so I can dim a too-bright light and control an outdoor light, since there aren't any weatherproof connected bulbs yet."

12. Jasco Z-Wave outdoor modules
WHERE: Backyard, rooftop
WHY: "They're outdoor-friendly outlets—great for controlling Christmas lights or fans with your smartphone."

ILLUSTRATION BY L-DOPA

Going Global

There's one surefire way that North American companies can boost revenues—expand beyond the borders.

Foreign direct investment inflows into Europe grew by **36%** in 2014 over the year prior, the largest gain of any region in the world.

–Ernst and Young 2015 European Attractiveness Survey

FOR A CASE STUDY in how global expansion can fuel performance, look no further than Brookfield Asset Management. Over the last decade, shares in the alternative asset management company rose by 230%, compared with 75% for the benchmark S&P 500. Brookfield's assets under management jumped from $30 billion to more than $200 billion over that same time period.

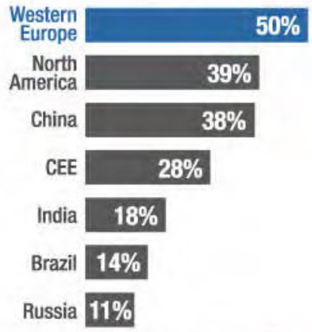
In 2005, most of Brookfield's assets were in North America—save for some properties in Brazil, its country of origin 100 years ago. But management realized that by investing internationally in property, infrastructure, renewable energy, and private equity, the company could expand its asset base and generate better and more dependable results. In addition to its investments in North and South America, Brookfield's portfolio now includes assets in Australia, Europe, India, and China.

"The only way to successfully grow at that pace is to take a global view," says Kelly Marshall, a managing director at Brookfield.

Here's how it has done so: by teaming up with sovereign wealth funds and other institutional investors, along with global banks such as HSBC.

ATTRACTIVE AREAS

Here's where companies said they want to be in 2015



Source: EY's 2015 European Attractiveness Survey

Boots on the Ground

For most major companies, international expansion is a necessity, says Marianne Rowden, president and CEO of the American Association of Exporters and Importers. There are only so many people—or in Brookfield's case, properties—in the U.S. "Once you've saturated the market, who else are you going to sell to?" she asks.

Numerous statistics prove this logic correct. For instance, between 1985 and 2010, exporting companies had an average three-year post-IPO cumulative return of 45% compared with 15% for non-exporting companies, according to the Midwest Finance Association.

However, while the Internet has made it easier to meet potential clients, locate partners, and do market research, companies still need an intimate knowledge of the region they want to sell into, says Rowden.

When Brookfield wanted to enter the European market—specifically the U.K.—it opened a London office, but it didn't buy much for five years. "We weren't aggressive in the market when we first arrived," says Marshall. "What we did was old-school knocking on doors and building relationships. As much as technology has helped, business is still about building personal relationships."

Finding Partners

That relationship building has more than paid off. In 2002, Brookfield took a 22% stake in the Canary Wharf Group, owner of Canary Wharf, London's iconic 16-million-square-foot office and retail property. In April Brookfield, along with the Qatar Investment Authority, Qatar's sovereign wealth fund, purchased the rest.

When it comes to international growth, partnerships are critical, agrees Rowden. That could be business partners, but it's also local lawyers, accountants, brokers, and anyone else who can help an American executive better understand a new market and facilitate connections with potential clients, she says.

Having a strong financial partner is also important, adds Marshall. Brookfield looks to its banking partners for market

GLOBAL DEVELOPMENT: Brookfield has a 22% stake in London's Canary Wharf, a 16-million-square-foot office and retail property.

insights and transactional expertise. It often works with HSBC, which Marshall says has one of the deepest global presences of any of the institutions it deals with. For the Canary Wharf acquisition, HSBC helped Brookfield manage the transaction and recognize the rules around U.K.-based takeovers. "They help us understand the nuances," he says.

Expanding into Europe

American companies typically expand into Canada or Mexico first, but many businesses have their sights set on Europe, China, and India. The former is particularly interesting today, says Marc Lhermitte, a Paris-based partner at Ernst and Young.

While Europe has had its fair share of struggles recently, it is starting to recover. That's given companies the confidence to invest in the region again. According to Ernst and Young, foreign direct investment inflows into Europe grew by 36% in 2014 over the year prior, the largest gain of any region in the world. As well, 59% of investors think that Europe will become more attractive over the next three years, compared with 38% who said the same in 2012.

"It's a massively sophisticated market with impeccable logistics and a history of trade routes and partnerships," says Lhermitte. "People forget that it's an old continent that has been doing business for centuries."

Since Brookfield is focused on finding high-quality revenue-generating assets, there's no doubt that its international expansion plans—and rise in revenues—will continue. Europe, and the U.K. in particular, remain on its radar. "The U.K. real estate market is poised for continued growth," says Marshall. "We're going to invest in it and grow."

For the latest macro insights and trends, visit **gbm.hsbc.com.**

Philippe Henry, HSBC's Head of Banking for Continental Europe and Africa, explains why Europe is a top destination for American companies.

International Insights

Q: Are you seeing more U.S. trade with Europe today?

A: Yes. One reason is macroeconomic—the euro is weak vis-à-vis the dollar. Low oil prices and historically low interest rates also help. More U.S. corporations are wanting to invest in Europe because they borrow in euros at favorable rates. It is better for them to increase local production capabilities in Europe rather than importing goods from the U.S.

Q: Besides low rates, why should an American company expand to Europe?

A: Europe is the world's biggest trade region. It accounted for 38% of global imports and exports in 2012.* It also has a population of roughly 740 million, with an additional 530 million tourists visiting Europe annually.

Q: A lot of companies enter Europe via acquisition. What's the state of the M&A market today?

A: We've seen a revival in M&A. Between 2013 and 2014 the number of M&A transactions made by foreigners in Europe increased by 47%. As well, foreign direct investment in Europe by outsiders increased by 14% in 2013.

Q: How does the future look?

A: When I look at the top 15 trade countries in 2030, China and the U.S. will be the top two. But you'll see several European countries in the top 15, such as Germany, France, U.K., Netherlands, and Italy; judging by GDP, numerous European countries currently dot that list. So Europe is and will remain a top global business and trade destination.

*Source: Global Insight Comparative World Overview as of Sept. 15, 2014

Mining is not seen as a particularly tech-intensive operation, but that perception is wrong, Rockwell's John Nesi says.

DAVID GRAY—REUTERS

CANARY IN A COAL MINE

For the industrial giants that ROCKWELL AUTOMATION serves, the value of Internet-connected equipment isn't theoretical. It's transformative. *By Barb Darrow*

THINK ABOUT IT: The raw materials we need to survive in the modern era—oil, gas, metal—often come from remote, dirty, hostile environments. We process them in environments that are equally intolerable.

You can imagine, then, why so many industrial companies are keen on the so-called Internet of things. Enabling an oil-rig operator do his job from a climate-controlled room rather than a desert where temperatures can reach 120° F is a godsend. To help him identify which machine part will malfunction next and save the company big money? Icing on the cake.

All this comes courtesy of sensors that collect data, wireless infrastructure that transmits it, data centers that store it, and software that analyzes it. Properly applied, these technologies can change the way an industrial company operates.

Rockwell Automation has been working with companies like Shell Oil and Australian mining giant BHP Billiton to "instrument," as Rockwell calls it, their field operations. A $10 air filter that sucks in too much grit can crash a million-dollar compressor, says John Nesi, vice president of market development for Rockwell. By monitoring sensor data, an operator can pinpoint when that filter may fail and dispatch a repairman with a new part well before disaster strikes.

None of these "predictive maintenance" technologies existed when Rockwell was founded as Allen-Bradley in Milwaukee in 1903. (Back then, rheostats and motor starters were all the rage.) But visit a mining operation in Australia today and "there are sensors in the ground to understand ore characteristics that are beamed up to a satellite and from there to the cloud," Nesi says. Meanwhile, driverless trucks do the heavy lifting. It all adds up to fewer people on-site and more operators minding the shop from Perth.

"It's impossible to get workers out there without spending a million dollars a year per worker," Nesi says. Frequent site visits to check things come at a cost.

Market researcher Gartner predicts that there will be 25 billion connected "things" in use by 2020; GE says they could eliminate more than $100 billion in waste. Sure, it's a dirty job—all the better to have a machine do it.

ROCKWELL

COMPANY SNAPSHOT

RANKING 409

HEADQUARTERS Milwaukee

EMPLOYEES 22,500

REVENUE $6.6 billion

PROFIT $826 million

STANDING UP AT THE GATES OF HELL

Cyberattackers are using cloud computing to wreak havoc on the business community. CrowdStrike CEO GEORGE KURTZ won't back down. ***By Robert Hackett***

IT'S NOT EVERY day that a company can compel hackers to give up. Yet that's exactly what CrowdStrike managed to do earlier this year.

CEO and co-founder George Kurtz tells it like this: A besieged customer needed backup. So Kurtz's team sent in reinforcements, placed its cloud-based software sensors across the breached business's computing environment, and started gathering intel. Aha! Investigators spotted Hurricane Panda, an old Chinese nemesis that Kurtz's crew had been battling since 2013. What happened next surprised them: When the attackers scanned an infected machine only to find traces of CrowdStrike, they fled.

CrowdStrike's reputation precedes it. The company, founded in 2011 and based in Irvine, Calif., has gone toe-to-toe with some of the world's most sophisticated state-sponsored hacking groups. The firm analyzed the data behind the breaches of millions of sensitive records at the Office of Personnel Management, the federal agency responsible for human resources, in what may have been the biggest act of cyberespionage the U.S. has ever seen. It has published threat reports on many of the more than 50 adversaries it tracks, which include the likes of Ghost Jackal (the Syrian Electronic Army), Viceroy Tiger (an Indian intruder), and Andromeda Spider (a criminal coterie). Between 2013 and 2014 its revenue grew 142% and its customer base more than tripled, two reasons Google Capital, the tech giant's growth equity arm, led a $100 million investment in CrowdStrike in July, its first ever for a computer security company.

Kurtz used to travel hundreds of thousands of miles a year as CTO of McAfee, now called Intel Security, to meet with beleaguered customers. It struck him that they did not need more anti-malware and antivirus products, the traditional realm of information security, so much as software oriented toward tradecraft and technique, the domain of cyberspies. Co-founder and CTO Dmitri Alperovitch, then McAfee's head of threat intelligence, agreed.

The cloud model is essential to CrowdStrike's success. As its customers send data about their network activity into the cloud, CrowdStrike uses it to learn what different attacks look like and how to adapt to them. (It calls the approach "community immunity.") The cloud also allows for rapid deployment. Kurtz's team managed to get one financial services firm with 77,000 devices on its network up and running in two hours flat, faster than the hardware-based approach of some of its rivals.

The transition to the cloud originally gave hackers an advantage in the cat-and-mouse game that is cybersecurity. "These fraudsters used to work a street corner—they had a geographic area of stealing and limited scalability," Kurtz says. "Now, because of the cloud, they can scale exponentially—no longer a street corner but the entire globe."

Which is why Kurtz and company are set on fighting fire with fire in a sort of dogfight in the cloud. "We need to work at the same speed they're working," he says, "and keep up with them." ■

PHOTOGRAPH BY PATRICK JAMES MILLER

Worth Its Weight in COPPER

The infinitely recyclable metal is serving the world in increasingly sustainable ways. Here's how.

HERE'S A QUICK QUIZ: Can you name an element that contributes to energy efficiency, enhances the food supply, is naturally present in our muscles and bones, and improves public health?

The answer is copper—a metal that has been recognized for its remarkable attributes ever since the ancient Romans mined it on Cyprus. Today, professionals from doctors to engineers to electricians are using the element to advance the quality of life for people around the world. Consider: One tonne of copper used in conductivity can result in hundreds of thousands of dollars in energy cost savings annually. And in a world where fishing stocks are rapidly depleting, fish hatcheries are raising healthy, fast-growing fish in copper-alloy enclosures.

As well, copper's antimicrobial properties help prevent hospital-acquired infections that kill as many as 1,000 people around the world each day.

"Through investments by our members, the copper industry has invested $43 million since 2005 to make a positive impact on public health," says Steve Kukoda, vice president, International Copper Association. "It's a great example of how this industry is committed to the people it serves."

> "THE COPPER INDUSTRY HAS INVESTED $43 MILLION TO MAKE A POSITIVE IMPACT ON PUBLIC HEALTH."
>
> STEVE KUKODA, VICE PRESIDENT, INTERNATIONAL COPPER ASSOCIATION

And the industry is doing so sustainably—in every sense of the word. It's extracting this versatile metal from locations around the world in a responsible manner—in a way that not only sustains the earth, but that also benefits the surrounding communities.

"Sustainability, in the greater picture, is about combining economic growth with social and environmental responsibility," says William Cobb, vice president, environmental services and sustainable development with Freeport-McMoRan, a natural resources company that mines copper internationally. "It means working with communities to preserve cultural traditions, mitigate impacts from our mining operations, and forge partnerships to invest in infrastructure and other projects that provide for sustainable communities. So we regularly hold workshops, focus groups, town hall meetings, and surveys to get a sense of the sustainability risks and opportunities in all our locations. That applies whether we're dealing with our mines on U.S. soil or those in faraway locales, like the Democratic Republic of Congo."

Partnering with communities to address social, environmental, and economic concerns is not only the right thing to do, but it's practical as well, says Freeport-McMoRan CEO Richard Adkerson.

"In some of the places where we have mines, we're the focal point for all the economic activity in the area," he points out. "So we're raising the standard of living through our hiring and training practices and the support we provide in terms of health, education, and long-term sustainable economic development. One example: We've invested in women's economic empowerment, including an online entrepreneurship skills training program that has reached more than 3,600 women in Latin America."

William Cobb adds that the company is also constantly looking for ways to mitigate and minimize the environmental impact of its operations. In the DRC, for example, prior to any mining disturbance, the company constructs artificial ecosystems to transplant rare plant species.

"We continuously strive to improve our sustainable development programs," says Cobb. "In fact, 13 Freeport-McMoRan sites were certified by the Wildlife Habitat Council's Wildlife at Work program, which recognizes activities that create, conserve, and restore wildlife habitat. From comprehensive water resource management and proactive energy-efficiency improvements to site reclamation and habitat restoration, we work hard to protect and restore the environment."

Cu International Copper Association
Copper Alliance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JORDAN SPIETH
USA
THERE'S ONLY ONE WAY
TO GET INVITED.
BE THE BEST IN THE WORLD.
BUBBA WATSON
USA
SERGIO GARCIA
SPAIN
JUSTIN ROSE
ENGLAND
JASON DAY
AUSTRALIA

Invest

GLOBAL 500 STOCK SCREEN

THE VIEW FROM THE TOP LOOKS PROMISING

These three Global 500 stocks share a few virtues that are seldom seen together: great recent returns, strong sales growth, and reasonable share prices. *By Jen Wieczner*

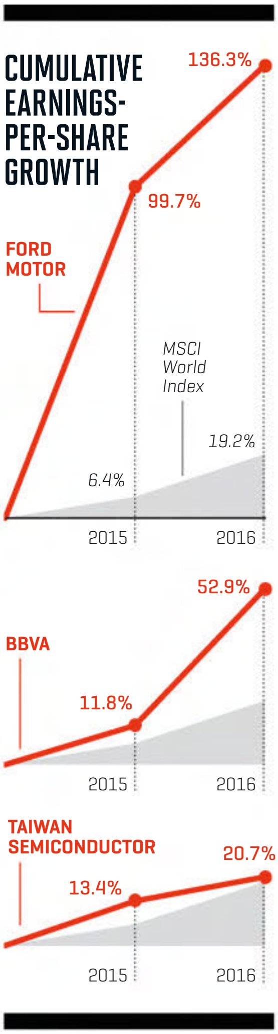
WHEN YOU INVEST GLOBALLY, the world's headaches become yours—but so do the world's opportunities. ¶ Both sides of that rhetorical equation have been on display this summer. Over a few rough weeks, a transnational investor could have been simultaneously stung by a European equity correction (thanks to Greece's implosion) and by Shanghai's sinking stock market—both of which also dragged down American stocks. But that same investor (after a deep, calming breath) could also have recognized the potential long-term benefits

ILLUSTRATION BY FOREAL

of global exposure. Foreign companies (represented by the MSCI World ex-USA index) are somewhat cheaper than American equities, as measured by price/earnings ratios, and they're also expected to increase their earnings faster through 2016.

With international diversity in mind, we've subjected *Fortune*'s Global 500 to a rigorous screen, looking for multinational companies whose stocks are positioned to leap ahead even if others struggle. We started with U.S.-listed companies that have outperformed the MSCI World index over the past three years—a sign of sustainable strength—but whose valuations are below that index's average. We wanted promising growth prospects, so only companies expected to deliver above-average earnings growth in 2015 and above-average sales growth this year and next passed muster. Finally, we required a dividend yield greater than the MSCI World average of 2.4%.

Our number crunching and talks with top investors left us with three intriguingly affordable companies from three continents. Here's why they're worth betting on:



TAIWAN SEMICONDUCTOR. Riding Apple's coattails is nice work if you can get it. Taiwan Semiconductor (known as TSMC), the world's biggest chip foundry, produces components that power devices from Apple and Qualcomm, among others. The success of the iPhone 6 has juiced TSMC's earnings, which are predicted to grow 13% this year—double the world average.

Lag time between blockbuster product launches can cause lulls in earnings; to help investors weather them, TSMC pays a 3% dividend yield. It also trades at a relatively cheap 12 times 2015 earnings. Some investors worry that more smartphone makers could emulate Samsung and manufacture chips in-house, or switch to Samsung chips. But if that happens, TSMC's size should insulate it. "In this type of business, you probably want to go with the leader, the one who's going to be around," says Arjun Jayaraman, a portfolio manager of the $1.8 billion Causeway Emerging Markets Fund, which holds TSMC stock.

FORD MOTOR. Christopher Brown is bullish on trucks, so he's bullish on Ford. The manager of the $2 billion Pax World Balanced Fund says the maker of the bestselling F-150 will benefit as more Americans buy trucks and SUVs, which account for two-thirds of the vehicles Ford sells. In the first half of 2015, U.S. drivers bought 10% more of such light trucks than they did the prior year, as cheap oil eased worries about mileage. Sales could accelerate further once Ford's more fuel-efficient F-150 hits full production this year, especially if construction rebounds: When business improves for contractors, Brown says, "the first thing someone does is buy a new truck."

Ford earns around 40% of its revenues abroad, and a weakening euro and slowing sales in China have hurt it. But with its shares trading at 9.2 times 2015 earnings, some investors believe it's undervalued. Edwin Miska, portfolio manager of the $1.9 billion First Investors Growth & Income Fund, sees Ford trading at $18 to $20 per share a year from now. Factoring in Ford's 4% dividend yield, that would be at least a 25% return—"pretty nice," Miska says.

BBVA. After the punishment Greek banks dealt to shareholders, recommending a bank in a bailed-out European country may sound like a bad joke. But Bryan Lloyd, a portfolio manager of the $5 billion Harding Loevner International Equity Fund, says that logic no longer applies to Banco Bilbao Vizcaya Argentaria (BBVA). In recent years, the Spanish bank has managed its risk much better than its peers, he says, and only 30% of its business is in Spain. "Two-thirds of their revenue comes from outside the European continent," Lloyd notes, in fast-expanding markets like Mexico and Turkey.

BBVA recently passed European regulators' stress tests with flying colors, and has "negligible" Greek debt exposure, says T. Rowe Price global portfolio specialist Kurt Umbarger. Its stock trades at 16 times 2015 estimated earnings, and per-share earnings are expected to grow 12% this year and 37% in 2016. Reinforcing that growth is a successful foray into online and mobile banking that has helped BBVA take market share from weaker banks. "It's very clear they're among the best," says Lloyd.

GRAPHIC SOURCES: BLOOMBERG; FACTSET RESEARCH SYSTEMS

Stocks That Win When Rates Rise

WHEN THE FED FINALLY HIKES INTEREST RATES, THESE BANKS AND INSURERS SHOULD HAVE AN EDGE OVER THEIR RIVALS.

By Lauren Silva Laughlin

READY OR NOT, here it comes: an interest rate hike. Headlines from abroad may be grim (GREECE DEFAULTS! CHINESE STOCKS PLUNGE!), but the U.S. job market and economy continue to improve, and most economists expect the Federal Reserve to raise its benchmark Federal funds rate from its rock-bottom low before the year ends—perhaps as soon as September.

That puts investors in unfamiliar territory, since the Fed hasn't boosted short-term rates since 2006. But generally, rising rates mean higher profits at banks and insurers, because higher rates increase their "net interest margin," the spread between their returns on loans and investments and the interest and claims they pay to customers. Analysts, baking in a rate hike, now estimate that bank earnings for 2016 will be a third higher than they were in 2014, according to S&P Capital IQ.

Still, some banks will increase their spreads—and earnings—much faster than others, says Paul Miller, bank analyst at FBR. One major factor is the composition of a bank's loan book. Commercial loans generally have floating rates that rise with the Fed's benchmarks; conversely, rates on mortgages are often fixed, sometimes for decades. Banks whose portfolios lean more toward commercial thus get a bigger boost when rates increase. Miller also favors banks with a high percentage of loans scheduled to roll over in a year or less, since those lenders can more quickly redeploy their money at higher rates.

Texas Capital Bancshares tops FBR's list of interest rate winners. The Dallas-based lender has about 42% of its balance sheet in commercial loans. And a stunning 96% of its $16 billion in assets are resetting within a year (the industry average is about 44%). FBR calculates that a 100-basis-point increase in the Federal funds rate—three or four incremental Fed hikes—would boost Texas Capital's pretax earnings by 36%. The bank's stock is up about 10% this year but still trades in line with its peer group.

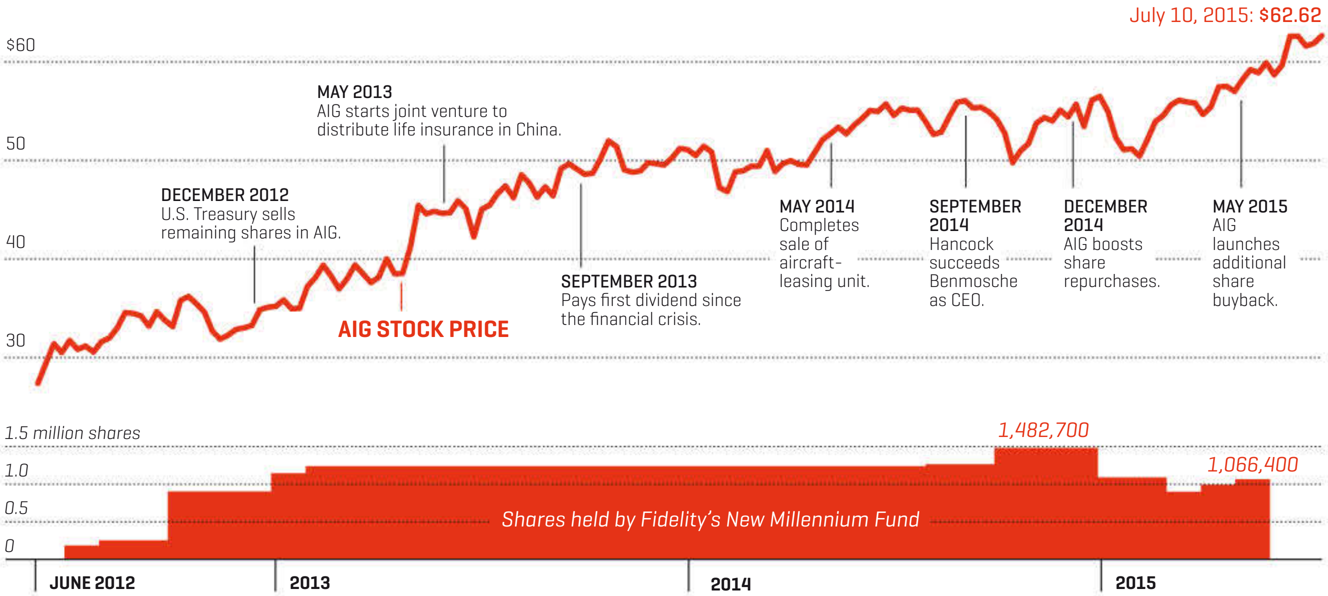
Miller also gives high marks to **Zions Bancorp.:** 53% of its $40 billion loan book is commercial. Salt Lake City–based Zions has another edge, Miller says: 43% of its customers' deposits are in non-interest-bearing accounts (think checking, not savings), which will keep expenses down as rates rise. Zions' stock trades at a relatively cheap 1.1 times book value, vs. 1.6 for large banks as a group.

For insurers, interest rates affect the spread between investment income—typically from real estate and bonds—and claim payments. Josh Shanker, an insurance analyst at Deutsche Bank, says that rate hikes are often a wash for property and casualty insurers because inflation boosts their claims in lockstep with their investment gains. Life insurers' claim payouts, however, are less sensitive to inflation, making those companies a better play. Yaron Kinar, also of Deutsche Bank, likes life and annuity giant **MetLife.** The stock trades at a steep discount to other life insurers and sports a better-than-average 2.9% dividend yield. Kinar thinks that a rate hike could boost MetLife's stock price 10% within a year and that the stock will continue to climb if more increases ensue.

ILLUSTRATION BY GUY SHIELD

A Second Look at AIG

INVESTORS WHO AVOID THE INSURER BECAUSE OF ITS PAST MISTAKES ARE MISSING OUT, SAYS FIDELITY'S JOHN ROTH. *By Lauren Silva Laughlin*



John Roth has managed the Fidelity New Millennium Fund since 2006, beating the S&P 500 handily over that stretch. His stock-picking approach relies in part on behavioral economics—he looks for situations where investors' irrational decision-making creates buying opportunities. That's one reason he likes insurance giant American International Group (AIG), a company he thinks some investors are still punishing because of its risky behavior during the financial crisis. New Millennium has owned a significant stake in AIG since 2012; Roth recently told *Fortune* why he's buying again.

BALANCE SHEET AND BRAND REPAIRED

AIG has unwound almost all of the credit default swaps and other toxic investments that turned it into a federal bailout recipient in 2008. And Roth notes that AIG retained more than 90% of its core insurance customers through the worst of the crisis. It remains a financial giant, ranking No. 152 on this year's Global 500.

Roth believes that AIG should trade at a premium to insurance rivals like Zurich Insurance and Ace Group. But its price-to-book ratio, at 0.78, is still only slightly above half that of its peers.

SMARTER SALES STRATEGIES

Short-term sales incentives can undermine insurers' long-term profits, Roth says. Agents may get impressive results selling underpriced products today, but those policies hurt the company's bottom line later as claims come in.

The late Bob Benmosche, AIG's CEO from 2009 until September 2014, realigned the company's focus so that actuaries and salespeople are rewarded for risk-adjusted returns rather than simple growth, says Roth. "The new system is much healthier," he adds.

A TECH UPGRADE

Under Benmosche and new CEO Peter Hancock, AIG has upgraded its technology infrastructure, Roth says, helping the company more accurately price its policies and cross-sell products. Last fall, shortly after assuming AIG's helm, Hancock appointed the company's first chief information officer. Roth says the tech overhaul has weighed a bit on AIG's sales in recent years—its 2014 revenue, at $64.4 billion, was down about 6% from the previous year—but he thinks it will pay off in the long run.

READY FOR REGULATORS

International regulators have deemed AIG a "systemically important financial institution"—that is, big enough that its failure could trigger another crisis. That designation will require it to keep an as-yet-undetermined amount of cash on its books. But Roth says AIG is working from a strong capital position; its debt-to-total-capital ratio has fallen 20% since 2012. And building reserves hasn't kept AIG from paying shareholders: It reinstated its dividend two years ago and has bought back shares in three of the past four quarters.

GRAPHIC SOURCES: S&P CAPITAL IQ; FIDELITY INVESTMENTS

The **"Imperial Swimming Dragons"** suite is composed of eleven (11) solid gold vessels manufactured in the Imperial workshop for the first Emperor of the Eastern Han Dynasty (ca. 25 - 220 CE).

This magnificent suite was created utilizing the most complex and intricate craftsmanship known to the Chinese goldsmiths in antiquity. it is certainly the most historically important and the most exquisite en suite set of gold artifacts from the Eastern Han Dynasty known. Some scholar's feel it is the finest gold set from any known culture of the period.

The finest execution of granulation, filigree, repoussé, inlay and other demanding techniques adorn virtually every surface. Both the micro and macro views of these creations are absolutely inspiring. Even a fragmentary piece of this style and technique, but of slightly lesser quality and condition, has been accorded National Treasure status in Korea, even though the artifact is not Korean.

Close examination of 1062 dragons and backgrounds reveals the curvilinear designs to actually be scenes full of life. Beautifully crafted bodies of impressive adult dragons with their cavorting young cover almost every exterior surface of all the artifacts in the suite.

In addition, swirling semicircles in filigree and granulation ring their bodies., suggesting ripples in the water through which the delightful creatures swim. The young dragons surface from the water in a variety poses and movements, including climbing upon their mothers' backs.

The supreme delicacy required in the construction of these treasures can almost be overlooked because of the boldness of the design as well as the charm and liveliness of the subject matter.

In addition to the extensive historical information inscribed on the artifacts, this suite is one of the most scientifically scrutinized sets of ancient gold artifacts known. Over two-and-a-half years of research for the purpose of authentication was performed by several of the world's leading scientists in the study of noble metals, particularly gold. These scientists reside in Switzerland, Germany, England and the United States The analyses include: Tool Markings, Patination & Construction Studies - Optical Microscopy - radiography - Uranium, Thorium - Helium Dating as well as XRF Elemental Analysis.

One of the most exciting procedures of scientific analysis performed on artifacts in the "Imperial Swimming Dragons" suite was Uranium, Thorium – Helium Dating (U,Th-He). This method is capable of dating the last time gold was heated above a critical temperature, which generally corresponds to the time an object was manufactured. Tests on numerous artifacts in the suite yielded ages consistent with the Eastern Han. Along with the other examinations firm scientific support of the authenticity of these treasures is provided.

INSCRIPTIONS FROM THE IMPERIAL WORKSHOPS

Gold vessels were officially reserved for use by the Emperor and his family, and inscriptions are often found on such important items. The largest vessel in the gold Swimming Dragon set, a jiŭzūn, bears the longest inscription, which includes the phrase chéngyú (乘輿), meaning 'utensils for the Emperor'. Not all artifacts marked with chéngyú appear to have been made solely for use by the Emperor, but the combination of this term with the use of gold for the Swimming Dragon set more than strongly suggests these magnificent luxury items were made for his personal use, and that of his family.

Though several vessels in the set use abbreviated dates, nearly all of the inscriptions on the Swimming Dragon artifacts specifically date the pieces as being made in the 24th year of Jianwu. This dates corresponds to either 48 or 49 CE, during the reign of Guang Wudi. Only one lidded bowl omits the entire date, but does state that the item was made in Xigong, Shujun which was considered the finest of the Imperial workshops.

The inscriptions on the Swimming Dragon artifacts offer a glimpse into the complex organization of the gold-working division of the imperial workshop at Xigong, Shujun. Most of what is known about the artisans and management of Han imperial facilities has come from inscriptions on lacquer wares. Comparison of lacquer inscriptions with those on the Swimming Dragon vessels reveals the use of the same format in syntax and style.

On lacquer, the details, and the order in which they were listed, changed over time. By the Eastern Han the format had been fairly well finalized, though research has shown that inscriptions from Xigong tended to be more detailed than those from other workshops. The Swimming Dragon syntax matches those on found on typical Eastern Han Xigong lacquer inscription, which began with the year and place of manufacture, followed by a description of the object. Next came a list of artisans' given names, each preceded by a description of their skill.

Following the artisans were the titles and names of various officials, and lastly came the measurements or volume of the vessel itself.

Now in the collection of the Beijing Palace Museum, one inscribed gilded-bronze (not shown) from Xigong is incised with a 62-character inscription. The lidded vessel was made in the twenty-first year of Jianwu, only three years before the Swimming Dragon set.

The corresponding syntax suggests that this format was standard throughout Xigong, regardless of the material being used.

An interesting connection exists between the Palace Museum gilt-bronze hú and the largest vessel in the Swimming Dragon set, a lidded jiǔzūn (Shown Left). Though the terms used to name each vessel differ, the overall shape is the same. Furthermore, both vessels are adorned with elaborate bear-shaped feet. With their long, and similar inscriptions, these two artifacts offer tremendous information found in Xigong during the Eastern Han.

In recent years this Imperial set has been exhibited in Xian and Beijing, China. Unfortunately, TK Asian Antiquities does not currently have the set on public display. While our natural inclination is to provide an exciting visual and visceral experience of historically relevant artifacts to all parties, they most regretfully must restrict viewing and inspection of the “Imperial Swimming Dragons” suite to a limited audience, by appointment only.

Extensive additional information is available. To schedule an appointment to view the Imperial Swimming Dragons Suite of artifacts at our New York or Williamsburg, VA galleries please call 855-266-9970 or email at info@tkasian.com

FORTUNE

EXECUTIVE TRAVEL BRIEFING

2015 TRAVEL TRENDS

CHECK IN

From smart luggage to hotel upgrades: what business travelers need to know now.

FROM THE FLIGHT DECK

Pilots have a thing or two to teach us about how to run effective meetings.

NEW FRONTIERS FOR THE ROAD WARRIOR

A business traveler's crystal ball would not have seen these trends coming 10 years ago.

CHECKIN

BY KAREN GOODWIN

◀ Bluesmart Luggage's connected bag

The Best Invention Since the Wheelie?

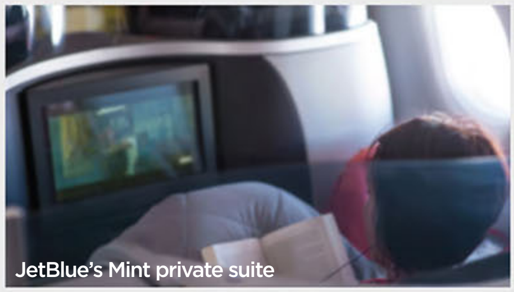
LUGGAGE MANUFACTURERS BUILD PORTS AND TRACKING INTO BAGS

Your phone is smart. How about your baggage? Luggage manufacturers are beginning to release high-tech bags that can be controlled via smartphone apps. Bluesmart is selling bags equipped with a Bluetooth-enabled lock, GPS tracking, a built-in scale and a USB port for charging a device. Samsonite has a new line of GeoTrakR suitcases with built-in LugLoc technology, which allows owners to track their bags. This fall, Andiamo will introduce a smart carry-on bag with a Wi-Fi hotspot, battery charger and built-in scale. Trunkster is planning to sell bags with a tracking system, scale and two USB ports late this summer. Delsey will introduce its Pluggage line of smart suitcases next year. And German luggage maker Rimowa is developing a smart suitcase line with permanent, embedded electronic bag tags.

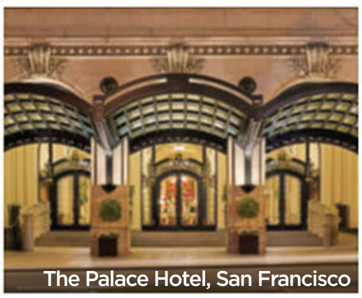
JETBLUE SOLICITS SMALL BUSINESS

NEW BOOKING TOOL HAS PRICE, POINT BENEFITS

JetBlue now has a free corporate booking tool called Blue Inc. that allows small- and medium-size businesses to obtain special rates through JetBlue's hotel and car rental partners; receive bonus TrueBlue loyalty points; and track and analyze employee spending, among other perks.



JetBlue's Mint private suite



The Palace Hotel, San Francisco

Starwood Upgrades

LODGING GIANT TO OVERHAUL LUXURY COLLECTION, SHERATON BRANDS

Domestic demand for luxury travel is at pre-recession levels, according to Starwood Hotels & Resorts, which is why the chain is spending $300 million to expand and improve its Luxury Collection in North America. The hotel chain also launched a 10-point plan, dubbed Sheraton 2020, designed to "put Sheraton back in the global spotlight." The initiative includes a $100 million marketing campaign, design innovations, enhanced service and the launch of the new Sheraton Grand Tier, which will feature more than 100 premier Sheraton hotels.

FROM THE EDITOR

Customer segmentation fascinates me. In business travel, this single trend drives so many others: It means that if you're a millennial, you can book a hotel designed just for your generation. It means if you need to arrive fresh at your London meeting, you can upgrade to a lie-flat seat.

Driven by big data and technology, travel providers can now market in personalized ways to offer more choices. The downside is that data has determined who I am and which choices I'll see.

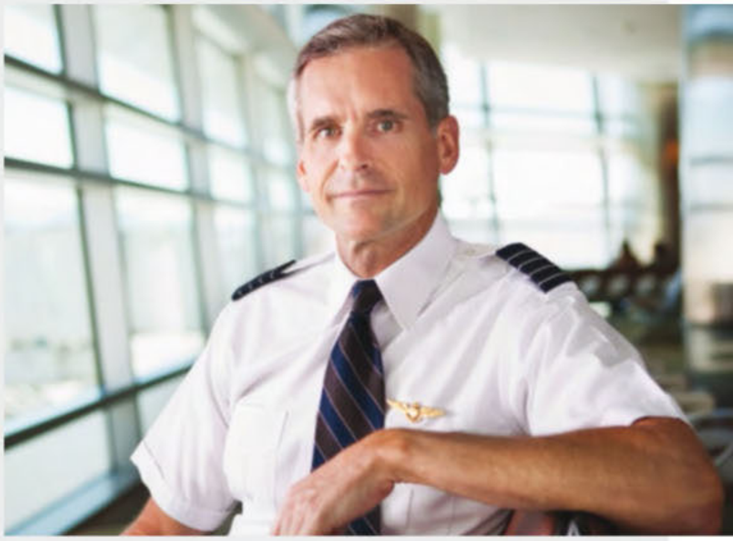
As travelers, we enjoy an endless array of options. However, as a result, the divide between first class and coach has never been so wide. What do I think about that? Well, I suppose it depends where I'm sitting.

Janet Libert

FROM THE FLIGHT DECK

CHRIS COOKE has been a pilot with a major domestic carrier for more than 20 years and currently flies long-haul routes on the 777. He began his career with the U.S. Marine Corps, received Navy flight training and was a Top Gun graduate.

Meet Me in Flight Ops



WHILE YOU'RE ON YOUR WAY TO THE AIRPORT, YOUR PILOTS ARE ALREADY MEETING TO PREP FOR YOUR FLIGHT

When you see your pilots in the cockpit as you board, they're usually busy with the prep of flight management or testing critical systems. But rest assured, we were in our flight operations center in the airport for more than an hour before, focusing on your flight.

Airline pilots are experts in repetition of tasks and compartmentalization. We accomplish the same tasks, the same way, every time. That goes for preflight planning as well.

Pilots at my airline are required to meet each other in flight operations an hour and a half before pushback for international departures and an hour before domestic flights. Flight Ops houses the office of the chief pilot and staff, who manage the airline's operation at that airport. It's also where pilots go to access computers and flight plans for upcoming flights.

Being on time and meeting up with the crew before heading to the plane is important. Take my last flight from LAX to Sydney, for example. I had flown with the captain and one of the other first officers several times before so I knew whom to approach, but I was meeting a new first officer for the very first time. After meeting the new pilot and finding out where he lives and how long he'd been on the 777, we got down to the task of approving the flight plan.

We'll usually gather around a rectangular table and spread out the various documents for review. Each of us will have a copy of the flight plan to review, then we'll pass the next documents around the table: maintenance, en route and destination weather forecasts, and any other important flight-related information. (We've all been issued iPads and have access to our flight plans electronically, but it's mandatory to have at least one printed copy of the plan in the event of electrical or battery failures.)

PILOT RULES MAKE BUSINESS SENSE

Apply flight crews' best practices to your meetings to boost efficiency and results:

- Expect all to arrive on time.
- Develop and use Standard Operating Procedures.
- Be clear about and stay focused on the mission.

We'll usually wrap up our business quickly because of Standard Operating Procedures (SOPs). Pilots rely heavily on SOPs because repetition and attention to detail are so important in aviation. If everyone is satisfied and we all agree with the plan, the captain signs off on it at one of the many computer terminals, making it a legal FAA-certified document.

It's not uncommon to fly with a different pilot each trip, or sometimes different pilots on each leg of a trip. If we didn't adhere to such strict guidelines on how to do our job, it could be chaotic and unsafe. Fortunately, our tried-and-true methods of meeting and preparation carry through to the rest of the flight and ultimately ensure your safety. ET

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THE NEW SPIRIT OF AFRICA

New Frontiers for the Road Warrior

Five trends that change the game for business travel

By Nancy Branka

Just 10 years ago, business travel had quite a different face. Now-common names did not even exist: The Boeing 787 and Airbus A-380 were still in testing, hotel brands like Aloft, Andaz, and Element were still on drawing boards and Uber was five years from launch.

Today, business travel is expected to continue to expand—the Global Business Travel Association predicts the U.S. sector will grow by 3 percent to about $300 billion in 2015, and rise by 6 percent in 2016. Meanwhile, innovation has also transformed all aspects of the trip.

Business travel today is impacted by a handful of megatrends. These include a growing reliance on smartphones and mobile booking, the expansion of international travel, a new generation of millennial business travelers and a growing economy. No news to any frequent traveler.

More interesting are the narrower trends spawned from these mega-movements. We've taken a closer look at a few that could not have been predicted 10 years ago.

1 The information middleman has been fired.

Technology certainly is one of the biggest drivers of 2015's trends. For business travelers, nowhere has tech been more helpful than in the delivery of information during a trip. "There's been an explosion of information that travelers can use without going through someone else," says Chris McGinnis, founder of Travel Skills Group and a business travel expert. He points to the example of new hotel concierge apps, which guests can use to place orders directly with room service. On the flight side, travelers can see exactly where their incoming aircraft is in transit or be notified of gate changes.

2 Ground transportation looks totally different.

Getting from point A to point B in 2015 is easier than ever, with more options. Uber disrupted ground transportation by making it about technology not just cars. According to Certify, an expense-reporting company, Uber rides accounted for 46 percent of expense-reported trips in Q1 2015, up from 15 percent in Q1 2014. Taxi services have been dramatically affected by Uber too, impacting distribution and challenging these providers to up their technology games.

© M-IMAGEPHOTOGRAPHY/ISTOCK

3 Exchanging money is obsolete.

Credit card innovation has revolutionized the way business travelers relate to currencies when traveling internationally. "It's common now to travel to another country and return never having exchanged any money," says McGinnis. "Everywhere you go, you can pay with a credit card." There's no downside to this for the traveler, he adds, since most major credit card companies have eliminated foreign transaction fees. Also, American credit card companies have begun to adopt the chip-and-PIN technology (versus the magnetic stripe) that's become standard outside the U.S. As a result, travelers can now use these credit cards universally, including at kiosks such as those in European train stations, which require the chip-and-PIN card.

4 Business travelers are willing to share.

Airbnb, a sharing-economy lodging company, famously surpassed the valuation of Marriott this year, with a $24 billion valuation as compared with Marriott's $21 billion. While Airbnb's adoption by business travelers is currently limited, that is expected to change with a new generation. According to *Travel Market Report*, more than half of millennials say they would use peer-to-peer services such as Airbnb for corporate travel, which is significantly higher than Gen Xers or baby boomers. Other places the sharing economy has impacted business travelers are ground transportation, same-day discounted hotel reservations, airport parking and meeting space booking.

5 The hotel lobby is the new business center.

Remember the old hotel business centers that were staffed by real people, who could help you make copies and send faxes? Today, what a hotel markets as a business center may well be a single public computer in a hallway. But now there's a better, more convenient place to get business done: the hotel lobby. McGinnis notes that newer hotel brands have designed lobbies as places to work. Many offer free Wi-Fi, counter tables with outlets and access to printers. Add these practical considerations to a convivial networking atmosphere and the opportunity to order food and beverages, and you have a very pleasant place to get work done. ET

NANCY BRANKA is senior editor of *Fortune Executive Travel*.

TRENDING IN THE AIR

The centerpiece of any business trip is the flight. It's also where travelers most keenly feel the pain, both in the product and in disruption. Trends that particularly impact business travelers:

PASSENGERS HAVE MORE CHOICE.

Technology means airlines are able to personalize their offerings to customers, to break apart the product and offer more opportunities to buy the comfort level desired. A trip can be tailored to suit the needs of the traveler—assuming the company or traveler is willing to pay for it. The good news is that comfort can be purchased. The bad news is that when it's not, flights are more bare-bones than ever before.

LOYALTY PROGRAMS HAVE GONE THROUGH MAJOR DEVALUATION.

Most airlines have devalued their loyalty programs in the last year. Awards and upgrades require more points, and, perhaps more important, status is increasingly hard to achieve. But that may not be permanent. Chris McGinnis, of Travel Skills Group, notes that this trend reflects an economy that has rebounded, so it may change again in a future downturn. "When the economy contracts, companies cut back on business travel, causing airlines to offer incentives to get business travelers back," he says.

FUEL ECONOMY HAS TRANSLATED TO NEWER FLEETS.

Airlines have long been ultrasensitive to managing expenses. This drives airlines to retire older and larger aircraft to substitute new and more fuel-efficient metal. And that trend is expected to continue. The International Council on Clean Transportation predicts that the average fleet age for U.S. airlines in 2020 will be 11, down from 13 in 2013. These smaller, fuel-efficient planes have longer ranges than in the past, opening the opportunity for new international routes from midsize U.S. airports.

The Return of Animal Spirits

JAPAN IS IN THE THROES OF A CORPORATE GOVERNANCE REVOLUTION.

LAND OF RISING RETURNS | PAGE S2
IN SEARCH OF A NEW MODEL | PAGE S12

LAND OF RISING RETURNS

IN JAPAN, BETTER-MANAGED COMPANIES ARE GOOD NEWS NOT JUST FOR SHAREHOLDERS, BUT ALSO FOR THE NATION AS A WHOLE. THE VICE MINISTER OF THE FINANCIAL SERVICES AGENCY (FSA) AND THE HEAD OF THE COUNTRY'S STOCK EXCHANGE EXPLAIN WHY.

JAPAN
The Return of Animal Spirits

THE COMBINED IMPACT OF THE JPX-NIKKEI 400 AND THE GOVERNANCE CODE HAS TRANSFORMED THE MINDSET OF CORPORATE JAPAN.

AKIRA KIYOTA
Director and Representative Executive Officer, Group CEO of Japan Exchange Group

ON THE COVER: A 40-foot-tall sculpture of movie monster Godzilla's head was installed on the commercial complex in the Shinjuku shopping and entertainment district.
Photo: Hotel Gracery Shinjuku/ © TM & © TOHO CO., LTD.

IN JAPANESE COMPANIES' ANNUAL REPORTS, there is one little word that is notable by its absence: "your." The phrase "your company," a reference to shareholders as the ultimate owners of the business, may be a staple of Western corporate literature, but is not yet big in Japan.

"Traditionally, Japanese managers' awareness of where their companies' equity capital came from was low," explains Akira Kiyota, director and representative executive officer, group CEO of Japan Exchange Group, operator of the Tokyo Stock Exchange and Osaka Exchange. "Many even thought it was theirs. Of course, the capital belongs to the shareholders who have entrusted it to the managers. Their job is to manage it effectively."

If Japanese managers were never great believers in managing for shareholder value in the first place, that tendency was only exacerbated by a long series of financial and economic crises that started with the 1989 collapse of the bubble economy. "With some justification, managers became defensive and focused on stability and safety. This lack of risk-taking spirit meant that capital was not deployed boldly," Kiyota says.

The numbers certainly prove his point. Until recently, Japanese companies managed an average return on equity (ROE) of roughly 5%. This compared unfavorably with an average of 15% in Europe and the U.S., and the global average of 12%. The good news, however, is that Japan's performance has started to pick up: Over the last few years, average ROE has surged from 5% to 8.5%.

AKIRA KIYOTA

HISAYOSHI OSAWA

CHANGE AT THE TOP

What triggered this jump? The key factor was the December 2012 election of reforming Prime Minister Shinzo Abe. With clearly stated goals—exiting deflation, getting the economy growing again, and using increased tax receipts to address government indebtedness—and an

easy-to-understand tool kit to achieve them, the "three arrows" of monetary easing, flexible fiscal policy, and deregulation heralded Abe's arrival on the scene and prompted a change in the national mood.

For his part, Kiyota sees "Abenomics," as the Prime Minister's policies are nicknamed, as resting on one simple insight: that the private sector is the ultimate engine of economic growth. When private businesses increase their profitability, they become stronger; stronger businesses are rewarded with higher stock prices; higher stock prices mean more wealth for ordinary Japanese people; more wealth translates into more growth capital for the private sector and higher tax receipts for government; and higher tax receipts mean a lower government debt and a more robust country economically.

Takao Ochi, Parliamentary Vice-Minister at Japan's Financial Services Agency (FSA), is of the same opinion. He describes all the recent initiatives of the FSA as being "designed to trigger a virtuous circle whereby the financial economy and real economy become mutually reinforcing."

The crucial first step to making the Japanese economy more "muscular" and turning it into "a global winner" (both aims of the Abe government) was to get Japanese managers to "switch from defense to offense," Ochi says. Here, improved corporate governance was key. By making decision-making faster and more transparent, says Ochi, good governance enables companies to respond to challenges faster and therefore achieve the long-term growth that benefits both direct stakeholders and the broader economy.

The Abe government took two very specific measures: launching a stewardship code for institutional investors in February 2014, followed by a corporate governance code in June 2015. (In addition, the Companies Act was revised in June 2014, to encourage the use of outside independent directors.)

The stewardship code is designed to encourage the institutional investors who represent pensioners, insurance policyholders, and so forth, to engage in "constructive engagement and purposeful dialogue" with the companies in which they invest. By contrast, the corporate governance code is a set of principles targeted at the companies themselves. "The two codes are like the front and back wheels of a car," quips Ochi.

Japan Exchange Group's Kiyota similarly praises the way the two codes intermesh to invigorate companies both from the outside in (the stewardship code) and from the inside out (the corporate governance code). "It's a very sophisticated mechanism," he says approvingly.

The reception accorded the stewardship code has been enthusiastic. In the 15 months after its introduction, 191 institutions, including all Japan's major asset managers, signed up. "This is a major change," declares Ochi. But whether Japan's hitherto entirely passive institutional investors will suddenly start engaging with problem companies remains to be seen.

One encouraging sign is the new receptiveness that Japanese companies are showing toward non-Japanese activist investors. When Daniel Loeb of hedge fund Third Point put pressure on electronics-to-entertainment giant Sony and factory-automation leader Fanuc to create more shareholder value, Sony responded by selling off its PC unit and spinning off its TV division, while Fanuc promptly established an investor relations department for the first time in its history and promised to double its dividend.

THE CHOSEN 400

Japan Exchange Group is also doing its bit for corporate governance. In January 2014, it launched the JPX-Nikkei Index 400, designed to highlight the 400 Japanese listed companies that are doing the best job in using capital efficiently and boosting shareholder value. "To compile the list, we first look at three quantitative factors: high ROE, steady operating profit, and market capitalization," Kiyota explains. "The final selection is made based on more qualitative, governance-related grounds like the appointment of independent outside directors, the use of international financial reporting standards, and

CONTINUED ON PAGE S6 >>>

"WE WANT TO TRIGGER A VIRTUOUS CIRCLE WHEREBY THE FINANCIAL ECONOMY AND REAL ECONOMY BECOME MUTUALLY REINFORCING."

TAKAO OCHI
Parliamentary Vice-Minister at Japan's Financial Services Agency

HISAYOSHI OSAWA

Zooming In on Growth

CANON IS LEVERAGING ITS CAMERA TECHNOLOGY KNOW-HOW TO AGGRESSIVELY EXPAND ITS B2B BUSINESS.

IN 1996, FUJIO MITARAI, CHAIRMAN AND CEO OF CANON Inc., launched his Excellent Global Corporation Plan, an ambitious multiyear initiative designed to transform the Tokyo-based camera and office-equipment manufacturer into an enduring and globe-spanning enterprise. This year marks the end of the plan's fourth five-year phase. Taking stock, Mitarai has mixed emotions.

"The harshness of the environment of the last few years caught us by surprise," he says, citing negatives that include a European recession, a downturn in China, an earthquake in Japan, floods in Thailand, and an overvalued yen.

Canon rose to the challenge, cutting costs and raising productivity through production technology upgrades. As a result, the company strengthened its financial base, boosted its equity ratio to 67%, and maintained its profitability levels. "I'm pleased with the outcome," says Mitarai, "because in addition to our financial robustness, we have a range of new products coming out."

Indeed, many of Canon's new offerings have their origins in the innovative technologies the firm developed to get through the economic hard times. Take the MREAL mixed-reality system. By fusing computer-generated images with real-world environments, MREAL helped Canon bring down prototyping costs. Since its 2014 launch, designers of cars and buildings have been steadily adopting the system.

If anything, 3-D Machine Vision—a technology that leverages Canon's image-recognition and data-processing know-how—looks even more promising. A 3-D machine vision head, working in tandem with a robot arm, enables the system to identify components, pick them out of a random heap, and feed them into the assembly process, boosting speed and productivity. The market is growing extremely rapidly, with demand from the automobile sector especially strong. "The workforce is shrinking in developed countries like Japan, where societies are aging and the birthrate is low," says Mitarai. "Factory automation is a major trend."

A 3-D machine vision head working with a robot arm.

ON-TREND, SYSTEMATIC, GLOBAL

Addressing such megatrends is key to developing new businesses. Quick to detect the global pickup in demand for services related to safety and security, Canon decided that a move into network cameras would be a natural progression for the firm—especially since the market is expanding at a brisk annual 20% clip.

But camera hardware—Canon's core competency—is only one part of the overall package. "The network camera business is a systems business," explains Mitarai. "The camera has to be combined with video management systems and analytical software tailored to the customers' needs—plus, you need a dedicated sales network."

Canon looked outside for the capabilities it lacked in-house, finding them in Milestone Systems, the Denmark-based leader in video management software (acquired in 2014), and Sweden-based Axis Communications, the overall industry frontrunner (acquired for around $2.7 billion in February 2015). Axis has a crucial web of relationships with the integrators who customize the systems and the resellers who sell them. This constitutes a huge competitive advantage.

"Axis is a great business with No. 1 market share globally. Together, we have a great position in an expanding industry. The sky's the limit," comments Mitarai, pointing out that network cameras are being used for an ever-expanding range of purposes beyond security, such as analyzing customer flow in stores or monitoring the elderly and vulnerable.

Axis's ongoing global expansion should also get a tailwind from the decentralized management Canon is implementing under its Three Regional Headquarters management system.

With this system, the world-leading businesses that Canon acquires in other parts of the world—whether Axis in Sweden or commercial printing equipment maker Océ in the Netherlands—will have full responsibility for running their own affairs. "These companies have an unbeatable understanding of how to do business in the countries where they operate, so letting them run things makes absolute sense," says Mitarai. "Freeing them to make decisions without needing to get guidance from the Japanese HQ means better global group coverage and speedier management."

Outside of Europe, Canon established Canon BioMedical, Inc. in the United States in March 2015. The new company, which is using genetic diagnostic tools adapted from Canon's CMOS sensors and technology based on inkjet printing, will serve as the worldwide headquarters for the firm's new biomedical business. Since the U.S. is the global life science leader, the location is the optimum choice.

Information gleaned from network cameras can be used for marketing research.

LATERAL EXPANSION

Structural market changes, such as the rise of the smartphone, mean that in the future the consumer camera business—where high-value-added models continue to sell robustly—will be less of a growth driver than it once was.

Canon is responding to this shift by leveraging its accumulated proficiencies in optical, sensor, and digital technologies to build a portfolio of new B2B businesses. Some of them—like network cameras or Cinema EOS System moviemaking equipment—represent a lateral progression from existing businesses; others—like health care—represent leaps into entirely new fields.

FUJIO MITARAI
Chairman and CEO
Canon

Because of these new realities, of the company's three business units—Imaging System (cameras, lenses, consumer printers), Office (multifunction devices, laser printers, document services), and Industry and Others—it is the last that looks set to grow fastest in the coming years.

Aside from innovations like MREAL and 3-D Machine Vision, the company is a well-established presence in semiconductor lithography equipment. This year the company is aiming to commercialize a revolutionary new semiconductor production system co-developed with an industry partner that uses nano-imprint technology to make sub–20 nm high-resolution processes possible.

"This new technology will open new doors for us," comments Mitarai, noting that Canon currently has over 50 other technologies in development.

The new production system will outperform conventional equipment on multiple fronts, with lower production costs, increased output, and fewer defects. With the rise of the Internet of Things, semiconductors are becoming ubiquitous in everything from home appliances to cars. Demand for the equipment to make those chips can only go up.

"We have maintained a robust financial base in order to push our next growth strategy aggressively forward as the global economy comes out of stagnation," concludes an upbeat Mitarai. "As a result, we have the resources to invest in research and in acquisitions too." ●

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disclosure of earnings information in English."

There is plenty of overlap between the JPX-Nikkei 400 selection criteria and the government's governance code, and their combined impact has transformed the mindset of corporate Japan. "More companies are announcing higher ROE as a management goal," he says. "People are managing with our index in mind."

But with only 400 places available for Japan's 3,400 listed companies, getting into the JPX-Nikkei 400 isn't easy—something that only increases the index's prestige.

The JPX-Nikkei 400's influence on governance will only grow as its popularity as an index increases. There are already five JPX-Nikkei 400 ETFs and some 40 JPX-Nikkei 400–linked investment trusts, with assets under management of some 650 billion yen. The mighty Government Pension Investment Fund (GPIF), with over ¥130 trillion ($1.08 trillion) in funds, also has a portfolio linked to the JPX-Nikkei 400, with an estimated value of several hundred billion yen, meaning that a total of around ¥1 trillion ($8.3 billion) of assets are tracking the index.

POWER TO THE PEOPLE

But if everyday Japanese people are to benefit from Japanese companies' improved performance, they, too, will have to change. The Japanese, Ochi points out, are great savers, with a huge ¥1,700 trillion ($14.16 trillion) in household assets. Of this, however, 53% is held in ordinary savings accounts and just 15% in stocks and investment trusts.

During deflationary times, hoarding cash makes sense, but when inflation kicks in—and, remember, beating deflation is a core goal of the Abe government—savers are better off holding "inflation-proof" assets like stocks and property. If the switch can be made, it will be a win-win: Japanese companies gain access to a larger pool of growth capital, while Japanese savers get to earn a higher return on their money.

To encourage the general public into the stock market, the government last year launched the Nippon Individual Savings Account (NISA) system—investment savings accounts exempt from taxes on capital gains or dividends for five years. So far, roughly 8 million accounts worth a cumulative ¥4 trillion ($33.3 billion) have been opened, a take-up rate that Ochi describes as "steady."

In its current format, the system has its critics. Some point out that in the context of a working life that spans decades, a five-year tax exemption is neither here nor there. Meanwhile, the majority of people who have opened NISAs, far from being the neophyte investors who are the target of the program, are people over 60 who already own a stockbroking account. That's why the FSA is planning to tweak the system to make it more attractive. "We intend to introduce 'Junior NISAs' for people under 20. This will enable the older generation to transfer assets in a tax-efficient way and expand the base of young account holders," Ochi explains. "Then, we're going to raise the annual investment ceiling from ¥1 million to ¥1.2 million." This latter move is a classic piece of nudge theory—a ceiling neatly divisible by 12 will encourage monthly payments and so boost participation.

Kiyota is a fan of NISAs. Unlike previous occasions when the government encouraged the public to move into stocks only for an overvalued market to fall, sparking disillusionment, the NISA launch coincided with a substantial rise in the market. That rise shows every sign of continuing as better-managed Japanese companies improve their earnings capacity, and as the GPIF, and the banking and insurance arms of Japan Post Holdings (the post office, which is due to go public this autumn) start to shift away from low-yielding Japanese government bonds into stocks.

"The timing of NISAs was very good," adds Kiyota. "So far, everyone has had a positive experience. We need this to continue for the general public to lose its prejudice against the stock market. That's what I'm hoping for."

On Nov. 16, 2012, the day that Yoshihiko Noda, Abe's predecessor, dissolved Parliament before the December election, the Nikkei 225 opened at 8,898. On April 22, 2015, it closed above the 20,000 barrier for the first time in 15 years. Although the real economy might be lagging after last year's consumption tax hike, and a tumbling oil price has made the task of exiting deflation harder, corporate Japan, in discovering good governance, seems to have rediscovered its animal spirits at last. ●

Tackling the Big Issues

PRINTING COMPANY **TOPPAN** IS PIONEERING SOLUTIONS TO PROBLEMS IN PUBLIC HEALTH, EDUCATION, AND ECO-FRIENDLY PACKAGING.

HEALTH COSTS ARE BALLOONING AS SOCIETIES AGE. Nowhere is that truer than in Japan, where people live longer than anywhere else. "Figures released last year show the government spending the equivalent of $315 billion per year on health care," says Shingo Kaneko, Toppan president and representative director. "About 30 percent of that goes toward lifestyle diseases like high blood pressure that can be tackled by changes in behavior."

Toppan is involved in a range of projects with municipalities around Japan designed to get people living healthier lives and thereby to help lower social spending—a key goal of reformist Prime Minister Shinzo Abe.

Take Yokohama, Japan's second-largest city. Since November 2014, Toppan has been part of the Yokohama Walking Point Program. Anyone over 40 who applies is issued a pedometer; the more they walk, the more reward points they get to shop with at local stores. Toppan is involved in promotion, data management and the reward system. Already 100,000 people have signed up—twice the initial target.

Toppan is also involved with the Wellness Point Project, a government-commissioned project currently underway in six cities nationwide. Again, participants are rewarded with points for healthy activities such as going to the gym or getting hospital checkups. "We're uniquely well positioned to act as a one-stop coordinator for complex, collaboration-based projects," says Kaneko. "We can create the necessary platforms, and by addressing society's problems in a practical, business-like way, help the government save money." Indeed, the government recently selected Toppan as one of the companies to administer Japan's new national ID card system for its 127 million citizens debuting in January 2016.

The firm is also getting into education. Together with a textbook-publishing subsidiary, it is currently developing a tablet-based study system for elementary schoolers. Software tracks the children's progress, notifying their teachers of their specific weak points and presenting them with special remedial drills. "This will remove stumbling blocks to learning in a timely fashion and help more children grow up to be productive members of society," says Kaneko.

GLOBAL SOLUTIONS

Inbound tourists to Japan are another group who require help of a slightly different kind when confronting the daunting language barrier. Here, Toppan has teamed up with the National Institute of Information and Communications Technology to develop a multilingual translation system for applications like augmented-reality-based content and interactive in-store digital signage.

Toppan is also aggressively expanding outside its home market. The firm is a major international supplier of printing systems for e-passports and ID cards to many countries around the world. In 2013, subsidiary Toppan Vite, a specialist printer for the finance industry, expanded from its base in Singapore and Hong Kong into New York, the biggest market in the world for initial public offerings.

Elsewhere in the United States, Toppan will open a new factory in Georgia in March 2016 for its transparent barrier film brand, GL FILM, having already opened a dedicated sales office in Chicago in April 2015. Lighter and more eco-friendly than traditional bottles and cans, GL FILM is used primarily for food and beverage packaging, but is gaining market share in the medical, electronics and industrial materials segments too. "Switching out of aluminum to environment friendly materials is a major trend," says Kaneko. "We're looking at a market worth about $21 billion in North America alone."●

SHINGO KANEKO
President & Representative Director,
Toppan

HISAYOSHI OSAWA

A Tradition of Change

AS ONE OF JAPAN'S PIONEERS OF GLOBALIZATION, SOY SAUCE MAKER **KIKKOMAN** IS ROUTINELY AHEAD OF THE CURVE.

THIS IS A YEAR OF ANNIVERSARIES FOR SOY SAUCE MAKER KIKKOMAN. Thirty years have passed since the opening of the company's Singapore plant, which supplies Asia and Oceania and was Kikkoman's second overseas plant after the U.S. "It's hard to believe, but Singapore was classified as a developing country in the early '80s," says Yuzaburo Mogi, honorary CEO and chairman of the board of directors. "We received favorable duties when we exported from there."

The other anniversary is slightly more abstract: ten years since the launch of Kikkoman's *shokuiku* (food education) drive. As part of this, Kikkoman runs factory tours in Japan and also sends employees into schools to explain how soy sauce is made. "For a food company like us, I believe food education is a core responsibility," Mogi explains. "It promotes good health—and, when families eat together, better communication, too."

To help popularize Japanese food, Mogi will be heading to Italy in July to attend Japan Day at Expo Milan 2015. "The Italians attach great importance to food culture," he comments approvingly of the country that pioneered the burgeoning slow food movement.

Kikkoman itself, however, has been quick to respond to evolving consumer behavior. As Japanese women increasingly entered the workplace in the 1980s, there was a shift from buying soy sauce and making *tsuyu* (noodle soup) and *tare* (dipping and marinade sauces) at home to buying ready-made products. One of Mogi's first acts upon becoming CEO in 1995 was to launch a range of such soy sauce–based products. "Demand was shifting," he observes. "It was the right thing to do."

Kikkoman is a frontrunner elsewhere, too. Take corporate governance. In June 2015, Prime Minister Shinzo Abe's government introduced a new corporate governance code that, among other things, encourages firms to hire more external directors—a practice Kikkoman has been following since 2002.

Governance is just one area where Mogi and the reformist Abe find themselves in accord. Between 2006 and 2012, Japan had a different prime minister every year—hardly a recipe for stability. The simple fact that Abe has stayed in power for two and a half years increases the likelihood that his reforms will produce results, Mogi notes.

Abe's reform program consists of "three arrows" to encourage growth: radical monetary easing, flexible fiscal policy, and structural reforms. "The first two arrows worked well, but to really revitalize the Japanese economy, we need positive results from the third one," states Mogi, who hopes to see further cuts to Japan's corporate tax rate.

As chairman of the Japan Productivity Center (JPC), Mogi is also working for the revival of the broader national economy. In a country whose population is shrinking, higher productivity is needed merely to maintain the same level of GDP. With average productivity at 70% of U.S. levels in manufacturing and just 50% in services, Japan still has plenty of room for gains. At the opening speech of the JPC's 60th anniversary reception, Abe announced the launch of the Nihon (Japan) Service Award created by the JPC to incentivize improvements in the service sector. The response has been overwhelming.

"Japan has had slow growth for the last 25 years," Mogi concludes, "but people are hopeful that growth is back again." ●

YUZABURO MOGI
Honorary CEO and Chairman of the Board
Kikkoman

HISAYOSHI OSAWA

Growth Through Diversity

INTERNATIONAL ACQUISITIONS, TECHNOLOGICAL INNOVATION, AND AGGRESSIVE EXPANSION OF LEGACY BUSINESSES ARE PROPELLING **ASAHI KASEI** TO NEW HEIGHTS.

ASK TOSHIO ASANO, PRESIDENT OF ASAHI KASEI, HOW the diversified chemical manufacturer has changed in the last five years, and the big numbers fly thick and fast. Between FY2010 and FY2014, overall sales and operating income both rose 28%. Operating income in health care, the standout of the company's four business segments, surged 338% over the same period. Meanwhile, the proportion of business the company generates abroad has increased by 50%.

It's no wonder, then, that Asahi Kasei posted record-breaking results for a second year running, with sales up 4.7%, to $16.5 billion (¥1.99 trillion), and operating income up 10%, to $1.3 billion (¥158 billion). Driving this outperformance is "For Tomorrow 2015," the company's five-year plan to turn itself into a growth machine by expanding its world-leading businesses and creating new businesses built around health, comfort, and harmony with the natural environment.

"This is the last year of the plan. The numbers prove that by changing its portfolio, Asahi Kasei has transformed itself into a highly profit-generative company," says Asano. "And that enables us to return more money to shareholders: The dividend's almost double the level of five years ago."

THE ACQUISITION TRAIL

Bold, transformative acquisitions are one key ingredient of the company's growth spurt. In February 2015, Asahi Kasei announced an agreement to acquire North Carolina–based membrane manufacturer Polypore International, Inc. for $2.2 billion. Asahi Kasei is a leading supplier of battery separators for the lithium-ion batteries in PCs and smartphones; Polypore's strength, meanwhile, lies in battery separators used in both conventional vehicles and electric vehicles. "When we combine our resources, we'll be able to offer fabulous products," Asano declares. "Supporting broader take-up of electric vehicles is one way we can contribute to society."

Asahi Kasei has a surprisingly large presence in the automobile business, delivering products that provide three categories of benefit: safety, comfort, and environmental friendliness.

"As regards safety," Asano explains, "we make S-SBR synthetic rubber for tires. It enables outstanding safety performance to be maintained even while reducing fuel consumption. We also manufacture the material used to make air bags. For comfort, we make artificial suede for car upholstery that's popular with high-end brands. When it comes to eco-friendliness, in addition to S-SBR we make raw materials for paint that help reduce noxious fumes, and engineering plastics that make cars lighter and more fuel-efficient." The company is currently building a new plant to manufacture engineering plastic compounds in Alabama—part of a push into the U.S. across multiple sectors.

TOSHIO ASANO
President
Asahi Kasei

The $2.2 billion acquisition of Massachusetts-based acute critical care specialist ZOLL Medical Corporation in 2012, for instance, is evolving in some interesting directions. Researchers of ZOLL and Asahi Kasei are working together to develop services based on analysis of the data provided by the people at risk of sudden cardiac arrest who have used ZOLL's LifeVest wearable defibrillator—numbering over a hundred thousand—and exploring how to incorporate Asahi Kasei's speech-recognition technology into medical devices.

A LIVELY LEGACY

Alongside these Silicon Valley–like initiatives, Asahi Kasei's chemicals and fibers businesses, which date from the company's founding in

HISAYOSHI OSAWA

1922, are going great guns. Synthetic rubber is a case in point: Having completed one 50,000-ton-capacity production line for S-SBR in Singapore in 2013, Asahi Kasei promptly added another in May 2015, doubling capacity. "If demand continues to rise, we may add a third line," says Asano bullishly. "We want to be world No. 1 for synthetic rubber for tires."

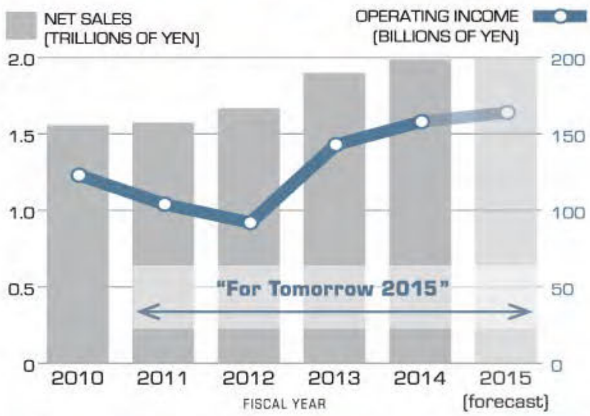
In fibers, two factories in Thailand are working flat out to provide ASEAN's exploding middle class with material for disposable diapers. Asahi Kasei is ideally positioned, producing not just nonwoven fabric for both top and back surfaces, but premium stretch yarn for the diaper's elasticized parts as well.

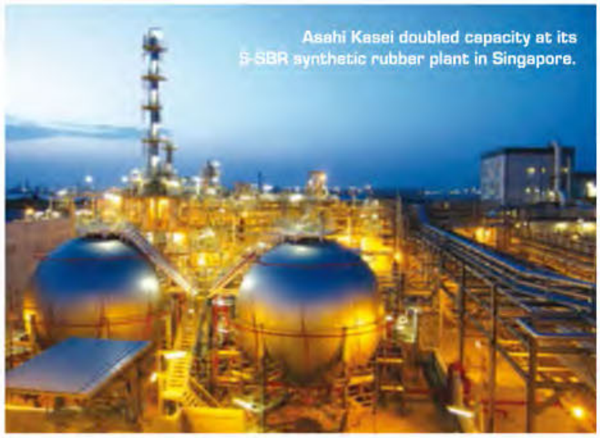
This June witnessed a milestone in the history of Bemberg™, a cellulose fiber that Asahi Kasei has been producing for 84 years. To meet surging demand from the Indian subcontinent, where the fabric is popular for saris, the company opened a new production facility in Japan—its first in three decades. "We invest aggressively in all our globally competitive business to seize the demand," Asano notes.

With "For Tomorrow 2015" in its last year, Asano is fine-tuning the next medium-term plan focusing on the theme of "Growth Through Diversity"—reflecting the firm's diversified business lines and the increasing diversity of its workforce.

"We want to harness the diversity of our people as a growth engine," Asano concludes. "Investors used to lecture us about needing to focus on one core business. Recently, they've realized what we knew all along: that diversification is our core strength. Asahi Kasei is about creating new businesses and taking on challenges. I want to strengthen that spirit going forward."●

Asahi Kasei's growth under the "For Tomorrow 2015" plan

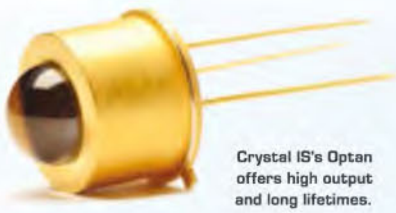




Asahi Kasei doubled capacity at its S-SBR synthetic rubber plant in Singapore.

LIGHTING THE WAY TO HEALTH

Crystal IS, based in Albany, N.Y., might be a small company, but its breakthrough ultraviolet LED technology looks set to play a big role in people's lives.



Crystal IS's Optan offers high output and long lifetimes.

What's the background of Crystal IS?
The company was founded in 1997 as a spinoff from Rensselaer Polytechnic Institute in Troy, N.Y. Asahi Kasei acquired it in 2011. It has about 40 employees.

What does Crystal IS make?
High-performance light-emitting diodes that emit ultraviolet light (UVC LEDs), used in sterilization and purification, and for scientific and industrial measuring instruments.

Can you give us some examples?
Ultraviolet is used in industries like food processing and pharmaceuticals to reduce the risk of harmful bacteria. Ultraviolet germicidal irradiation in air-treatment systems helps combat airborne pathogens in hospitals.

What about treating drinking water?
Crystal IS's bright UVC LEDs kill biological contaminants like protozoa, bacteria, and viruses. Unlike chlorine disinfection, it doesn't produce any toxic byproducts or air emissions.

Why are your LEDs better than traditional UV lamps?
Traditional lamps contain hazardous mercury, don't function well in cold environments, and need time to warm up. LEDs are low-power, instantaneous light sources that perform well under all conditions. LEDs are also less fragile than quartz mercury bulbs.

Why does the tie-up with Asahi Kasei make sense?
By leveraging both firms' strengths, Crystal IS launched Optan for analytical and instrumentation applications last year. The company is also developing new products for sterilization and disinfection—the application with the biggest potential. Together, Crystal IS and Asahi Kasei can accelerate the creation of sustainable solutions for healthy living.

IN SEARCH OF A NEW MODEL

PUBLISHED IN DECEMBER 2014, PROFESSOR **R. TAGGART MURPHY**'S *JAPAN AND THE SHACKLES OF THE PAST* OFFERS A SWEEPING OVERVIEW OF JAPAN'S HISTORY FROM THE MIDDLE AGES TO THE PRESENT DAY. HERE HE SHARES HIS VIEWS ON THE ECONOMY.

JAPAN
The Return of Animal Spirits

"JAPAN IS A FASCINATING POLITICAL LABORATORY."

R. Taggart Murphy

R. TAGGART MURPHY

What are the "shackles" of the book's title?
The book is about the overhang of historical developments that's hampering the kind of overhaul of the economy and foreign relations that the Japanese people, or government, say they want. I devote a lot of attention to the economic model that the Japanese put together between 1945 and 1960. It was phenomenally successful; it propelled Japan from being a devastated economy to the world's No. 2 economic power in less than a generation.

The model worked so well that Japan became an object lesson for the developing world. The problem was that circumstances changed; the world of the early 1950s was very different from the world of the 1970s, not to mention the world of the 1990s. In the '50s and '60s, all the Japanese had to do was to take some leading company in the West, figure out how to produce a better quality product at a lower cost, and walk away with their market. That's not been possible since the early 1980s, but the success that came out of those peculiar circumstances of the 1950s and 1960s has to some extent blinded the policy elite to where the real strengths of the economy lie.

You see the 2011 earthquake and tsunami disaster as having revealed some of those strengths.
It sent out two very different kinds of messages: one was the look at the incompetence of one of the most important companies in Japan, Tokyo Electric Power Company, or TEPCO. But the other effect was just the opposite. The disruption to supply chains in the wake of the earthquake woke people up to the reality that the story about Japanese business decline is not a universal story. It does apply to many forms of consumer durables outside of automobiles, but when

HISAYOSHI OSAWA

you move up the supply chain you find that Japanese companies are enjoying preeminent market share—almost a lock hold—in all kinds of businesses.

That tallies with your view of "hidden champions" as Japan's greatest economic asset.
Hidden champions are companies that don't get much attention but enjoy preeminent market share in their products. And their products are purchased on the basis of quality and reliability rather than price, because the total percentage of their cost in the finished product is so low that purchasing managers care more about absolute reliability than cost. This plays to the Japanese economy's core competence of meticulous attention to quality and detail.

One example is Keyence. Keyence was the most profitable company in Japan in the first decade of this century measured by operating margins. When I give talks abroad, I ask people to raise their hands if they've heard of Keyence. Nobody ever has. They make sensing equipment. Any time you run your purchase over a barcode reader in a store, it's probably a Keyence product. It's not something that the ordinary consumer sees, but this is where you're seeing the real strengths of the Japanese economy emerging.

You mention that many of the wealthiest people in Japan made their fortunes by shaking up the service sector.
A small group of very wealthy people like Hiroshi Mikitani of Internet marketing company Rakuten has emerged. They don't yet constitute a class like the great Silicon Valley entrepreneurs, but they're very visible in the media, and ambitious young Japanese aspire to become like them. I'm not sure that those kinds of companies are going to be able to succeed going head to head with the great Silicon Valley champions. Also, I don't know whether the percentage of the total Japanese economy that such companies account for, or the percentage of the labor force that they employ, is large enough to propel the Japanese economy forward.

One view of Japan is as the "canary in the coal mine," tackling problems ahead of the rest of the world.
Japan is a fascinating political laboratory. You can see things happening there and learn lessons from them. Japan has gone through the same kinds of problems that you're seeing elsewhere—inadequate or declining jobs that promise middle-class incomes. In Japan, you don't see anything resembling the resentment that is increasingly fuelling the Tea Party and Occupy movement in the U.S. Maybe it's a negative lesson, but the Japanese seem to have figured out how to control political discontent from the dry-up of clear paths into the middle class.

On the other hand, I think there are real traps down the road from the emergence of a two-tier system with a "labor aristocracy" with job security and regular increases in income, and younger people for whom that's no longer the norm. Politically it hasn't translated into a crisis, but economically it's hampering a full recovery. People who live from month to month don't spend, so Japanese companies sit on their cash piles rather than building plants in Japan, and so on. That's why the Abe Government is jawboning companies to raise wages and offer more employment opportunities, but companies themselves are reluctant. It's a chicken-and-egg trap.

Your take on Japanese companies' efforts at globalization is interesting.
The business community recognizes that globalization is essential in an era when companies' supply chains, employees, markets and financing span the globe. But go beyond lip service to actually implementing programs to produce the kind of globalized organization people say they want, and things become difficult. You run up against deeply ingrained cultural and institutional patterns that are very hard to change. The stories of companies like Sony and Olympus and Nippon Sheet Glass, which attempted to integrate foreigners into the senior executive and upper-middle-management level, have generally not been happy ones. The socialization process in Japan—the education system, child-rearing practices—is long and arduous. It equips Japanese people with an internalized way of dealing with one another. There are common assumptions that allow people to understand each other here almost intuitively, while all kinds of things have to be spelled out to foreigners. One of the great strengths of Japanese corporations has been the ability to all pull together once a goal has been agreed on. It's not clear how that kind of socialization fits with internationalization.

What do you personally like about Japan?
It's a very comfortable place to live because everybody takes their responsibilities seriously. ●

– *GILES MURRAY*

"THE BUSINESS COMMUNITY RECOGNIZES THAT GLOBALIZATION IS ESSENTIAL."

R. Taggart Murphy


MIZUHO
One MIZUHO
MIZUHO
Redefining client-oriented service. One Mizuho.
Supporting businesses and economies for over a century, Mizuho is dedicated to your success and sustainable growth. With our global network and unrivaled expertise, we are committed to being your number one financial partner wherever you need us to be.
We aim to be Number One in customer trust
We aim to be Number One in service quality
We aim to be Number One in unified capabilities
One MIZUHO
Building the future with you
Mizuho Financial Group

Into the Big Leagues

MIZUHO FINANCIAL GROUP IS WINNING INCREASING INTERNATIONAL BUSINESS THANKS TO A CLEARLY DIFFERENTIATED STRATEGY.

RAPIDLY EXPANDING OPERATIONS OUTSIDE ITS HOME country of Japan were a significant factor in the better-than-forecast consolidated net income of $5.0 billion (¥611.9 billion) that Mizuho Financial Group reported for fiscal 2014. Overseas gross profits have risen 40% compared with fiscal 2011, with non-Japanese companies accounting for fully 72% of that total. In the same three-year period, the overseas loan balance was up 40% and overseas non-interest income 60%. Calendar 2014 saw Mizuho ranked No. 7 for syndicated loans in Asia excluding Japan—and No. 1 among Japanese banks.*

What is propelling this robust international performance? One driver is Mizuho's Super 30 strategy, which involves actively targeting global blue-chip companies with high credit profiles. Here, Mizuho's competitive advantages include a commitment to customer-oriented banking, in-depth sector knowledge plus a broad base of corporate customers, and integrated management of banking and securities functions.

The February 2015 acquisition of $36.5 billion of loan commitments from Royal Bank of Scotland (RBS) for $3 billion was a logical extension of the Super 30 strategy. The deal provided Mizuho with relationships with 200 customers of precisely the right kind—high-quality, investment-grade North American corporations. Over 100 RBS staff transitioned to Mizuho, bringing with them valuable know-how, networks, and—for customers—continuity. The deal has helped Mizuho enhance its market presence and should vault it from 16th* in the debt capital markets league table for U.S. investment grade corporate debt to within sight of the top 10 next year.

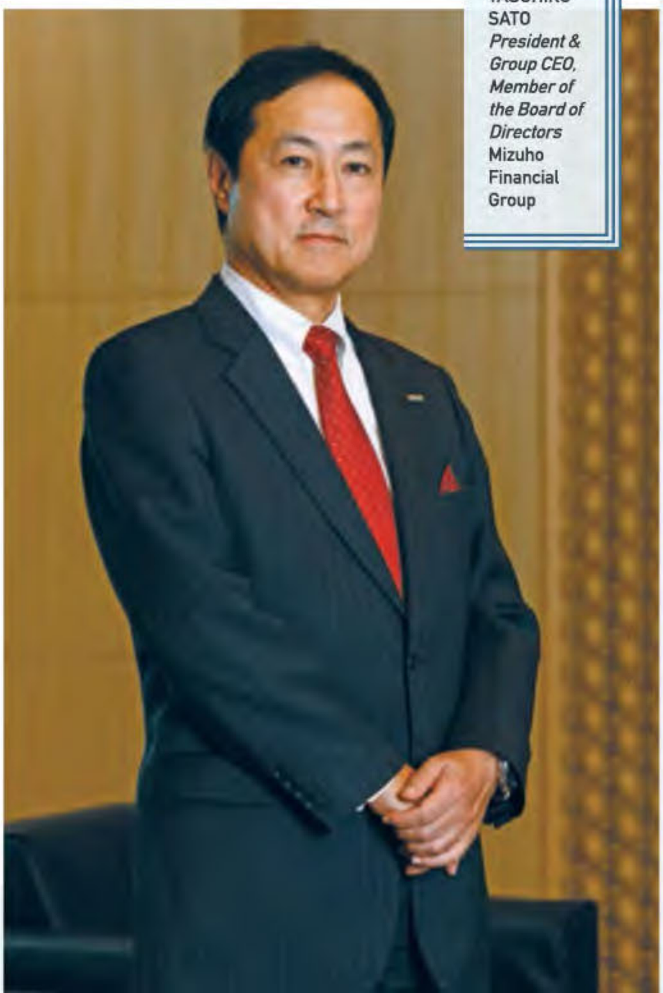
Mizuho also made headlines in November when it helped arrange the financing for 2014's biggest M&A transaction: generic drugmaker Actavis' $66.4 billion takeover of Allergan. Mizuho Bank was joint lead arranger and joint bookrunner of $46.2 billion of loans, while Mizuho Securities was joint bookrunner for $21 billion of bond issuance and $9.2 billion of equity issuance.

Targeting sectors where aggressive consolidation is under way, like health care, is one pillar of Mizuho's growth strategy. Western financial institutions have traditionally dominated acquisition financing, but Mizuho's close relationship with Actavis' top management and deep understanding of the business won it a place at the top table. The Actavis deal should be only the first of many.

Mizuho is expanding its international footprint as it globalizes. This year it is opening new branches or representative offices overseas in places such as Vienna (Austria), Yangon (Myanmar), San Francisco (U.S.), and Ahmedabad (India).

Back home in Japan, Mizuho is equally dynamic. The Abe government brought in its Corporate Governance Code in June 2015. Mizuho, however, had already adopted best governance practices last year by splitting supervisory and business-execution functions. This June, the company undertook to review its (substantially reduced) cross-shareholdings, eliminating any that are not "meaningful" and actively exercising voting rights on any it retains.

As Mizuho grows bigger and more diverse, developing a unifying corporate culture becomes more crucial. The company slogan "One Mizuho: Building the future with you" aims to communicate a clear goal to all stakeholders: to develop long-term relationships with customers through a sharp focus on their needs in order to become an invaluable partner—meaning the most trusted and best provider of comprehensive, integrated financial services worldwide. ●

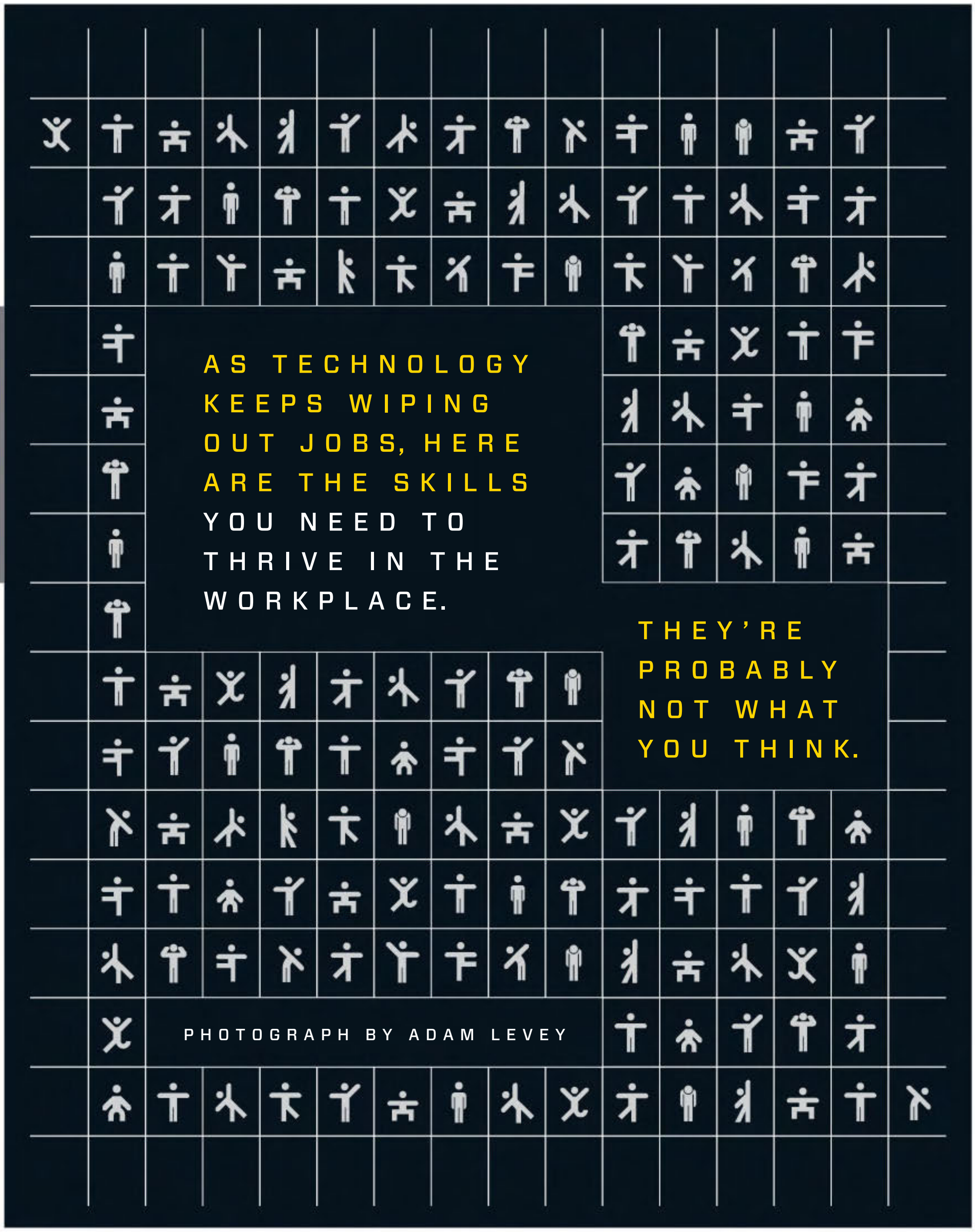


YASUHIRO SATO
President & Group CEO, Member of the Board of Directors
Mizuho Financial Group

* SOURCE: THOMSON REUTERS

HUMANS
ARE UNDERRATED

BY GEOFF COLVIN



ROBOT ARM CG BY SIMON DANAHER

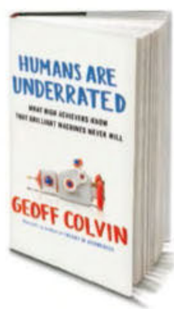
AS THE PEPPER ROBOT from SoftBank scurries about your home or office, it reads your emotions by your words, tone of voice, facial expressions, and body language. It then responds in all those ways; its hands and posture in particular are remarkably expressive. If you thought emotions were beyond the competencies of robots, you were right for a long time. But no more.

PREVIOUS SPREAD: ICONS BY MARTIN LAKSMAN. THIS SPREAD: DOCTORS: MARCO DI LAURO—GETTY IMAGES; AFGHANISTAN: ROBERT NICKELSBERG—GETTY IMAGES

High-value skills: Medical researchers conducting clinical trials of an Ebola vaccine in Sierra Leone (left) confer after interviewing community leaders about cultural issues that could affect the trials; without deep cultural knowledge, obtained in person, the trials might not succeed. A U.S. Army officer meets with local elders in Afghanistan (below). The U.S. military has realized that its most important work is now conducted in "the human domain"; it's ahead of most other institutions in training skills of personal interaction.

Maybe you believe that humans uniquely will always have to perform the highest-stakes, most delicate and demanding tasks in our lives, such as surgery. But researchers at the University of California at Berkeley are training a robot to identify and cut away cancerous tissue—not like today's surgical robots, which are actually tools used by human surgeons, but entirely on its own.

Adapted from *Humans Are Underrated* by Geoff Colvin, to be published on Aug. 4, 2015, by Portfolio, an imprint of Penguin Publishing Group, a division of Penguin Random House LLC. Also to be published in the U.K. by Nicholas Brealey Publishing.



Or perhaps you figure technology, for all its wonders, is just nibbling away at the edges of human employment. There aren't that many surgeons, after all. But in May, Daimler began testing the first self-driving semitruck on the roads of Nevada. The No. 1 job among American men, held by 2.9 million of them, is truck driver. Not that women are safe. Technology will continue to devour clerical and office tasks, and the No. 1 job among U.S. women, held for now by 3 million of them, is administrative assistant.

The greatest anxiety troubling workers today is embodied in a simple question: How will we humans add value? Popular culture is obsessed by it. *Humans,* a new series on the AMC network, spins a story from the promise and perils of eerily humanoid robots called synths. That seems to be Hollywood's 2015 theme of the year. Think of *Ex Machina* (humanoid robot outsmarts people, kills a man, enters society as a person) or *Terminator Genisys* (Arnold Schwarzenegger's humanoid robot must again save the world) or *Avengers: Age of Ultron* (humanoid robot tries to eradicate humanity) or *Chappie* (bad guys try to destroy humanoid robot police officer who is reprogrammed to think and feel). The big idea is always the same: For good or ill, machines become just like people—only better.

WE HUMANS HAVE good reason to be uneasy. Strange things are happening in the economy. Ever fewer men of prime working age—the group that historically has been the most thoroughly employed—are working (see chart), and while several factors are feeding the trend, most economists believe that advancing technology is one of them. In factories and offices, on construction sites and behind counters, technology keeps doing more jobs better than people.

Fear of technological unemployment is as old as technology, and it has always been unfounded. Over time and across economies, technology has multiplied jobs and raised living standards more spectacularly than any other force in history, by far. But now growing numbers of economists and technologists wonder if just maybe that trend has run its course. That's why former Treasury Secretary Lawrence H. Summers says these issues will be "the defining economic feature of our era."

How will we humans add value? There is an answer, but so far we've mostly been looking for it in the wrong way. The conventional approach has been to ask what kind of work a computer will never be able to do. While it seems like common sense that the skills computers can't acquire will be valuable, the lesson of history is that it's dangerous to claim that there are any skills computers cannot eventually acquire. The trail of embarrassing predictions goes way back. Early researchers in computer translation of languages were highly pessimistic that the field could ever progress beyond its nearly useless state as of the mid-1960s; now Google translates written language for free, better all the time thanks to feedback from human users, and Skype translates spoken language in real time, for free. Hubert Dreyfus of MIT, in a 1972 book called *What Computers Can't Do,* saw little hope that computers could make significant further progress in playing chess beyond the mediocre level then achieved, but IBM's Deep Blue beat world champion Garry Kasparov in 1997. Economists Frank Levy and Richard J. Murnane, in an excellent 2004 book called *The New Division of Labor,* explained how driving a vehicle requires such complex split-second judgments that it would be extremely difficult for a computer ever to handle the job; Google introduced its autonomous car six years later. Harvard psychologist Steven Pinker observed in 2007 that "assessing the layout of the world and guiding a body through it are staggeringly complex engineering tasks, as we see by the absence of dishwashers that can empty themselves or vacuum cleaners that can climb stairs." Yet iRobot soon thereafter was making vacuum cleaners and floor scrubbers that find their way around the house without harming furniture, pets, or children, and was also making other robots that climb stairs; it could obviously make machines that do both if it believed demand were sufficient. And the Armar IIIa robot, developed at Karlsruhe Institute of Technology in Germany, can unload (and load) the dishwasher.

The pattern is clear. Extremely smart people note the overwhelming complexity of various tasks, including some, like driving a car, that people handle almost effortlessly, and conclude that computers will find mastering them terribly tough. Yet over and over it's just a matter of time until the feat is accomplished, often less time than anyone expects. We just can't get our heads around the notion of computer processing power doubling every two years. At that rate, infotech power increases by a factor of a million in 40 years. The computing visionary Bill Joy likes to point out that jet travel is faster than walking by a factor of 100,

WHAT ARE YOU WORTH IN THE COMING ECONOMY?

As technology advances, the economy increasingly values the most deeply human interpersonal abilities: empathy, social sensitivity, collaboration, storytelling, leading, and relationship building. Rate your readiness:

1. When someone else is feeling excited, I tend to get excited too.

1. Never
2. Seldom
3. Sometimes
4. Often
5. Always

2. I have tender, concerned feelings for people less fortunate than me.

1. Never
2. Seldom
3. Sometimes
4. Often
5. Always

Which word best describes what the person in the picture is thinking or feeling?

3.

Playful
Comforting
Irritated
Bored

[CORRECT ANSWER BELOW]

4.

Joking
Flustered
Desire
Convinced

[CORRECT ANSWER BELOW]

5.

Joking
Insisting
Amused
Relaxed

[CORRECT ANSWER BELOW]

6. In your opinion, what influences people most effectively?

Reason				Emotion
1	2	3	4	5

7. How comfortable are you in talking publicly about yourself and your experiences?

Highly protective				Entirely open
1	2	3	4	5

8. How much time do you spend exploring and learning in fields entirely unrelated to your work?

None				Tons
1	2	3	4	5

9. How much time do you spend engaging with the members of your work team?

None				Tons
1	2	3	4	5

10. How would you rate your ability to converse for 10 minutes with a stranger?

Pathetic				Terrific
1	2	3	4	5

11. At the end of an initial meeting, how likely are you to remember someone's first name?

No chance				Got it nailed
1	2	3	4	5

12. How often have you given money to a stranger who needed it (or asked you for it)?

Never	Once	More than once	Often	Very often
1	2	3	4	5

13. How often have you helped a co-worker whom you did not know especially well with an assignment when your knowledge was greater than his?

Never	Once	More than once	Often	Very often
1	2	3	4	5

SCORING

Add the numbers associated with each of your responses; for the photo-related questions, score five points for each right answer and zero for each wrong one.

50+

You show an extraordinary level of interpersonal abilities and propensities. Don't hide them in the workplace; on the contrary, seek opportunities to exercise and apply them.

35–50

You're in the average range—not bad for now, but without improvement you'll find it increasingly difficult to be regarded as a high-value performer.

BELOW 35

You may not feel disadvantaged, because the economy has long offered good opportunities to people disinclined to personal interaction. But those days are ending. Begin building interpersonal skills right away.

ANSWERS TO PHOTO-RELATED QUESTIONS: 3. PLAYFUL; 4. DESIRE; 5. INSISTING

SOURCES: THE TORONTO EMPATHY QUESTIONNAIRE; THE READING THE MIND IN THE EYES TEST; THE ALTRUISTIC PERSONALITY AND THE SELF-REPORT ALTRUISM SCALE. PERSONALITY AND INDIVIDUAL DIFFERENCES, 1, 292–302

and that changed the world. Nothing in our experience prepares us to grasp a factor of a million. At the same time, increasingly sophisticated algorithms let computers handle complex tasks using less computing power. So year after year we reliably commit the same blunder of underestimating what machines will do.

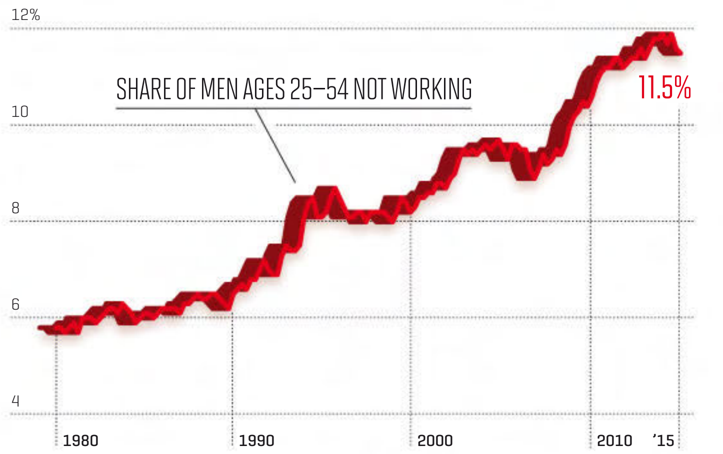
YES, FIGURING OUT what computers will never do is an exceedingly perilous route to determining how humans can remain valuable. A better strategy is to ask, What are the activities that we humans, driven by our deepest nature or by the realities of daily life, will simply insist be performed by other humans, even if computers could do them?

HUMANS WILL REMAIN IN CHARGE

A large category of those activities comprises roles for which we demand that a specific person or persons be accountable. A useful example is making decisions in courts of law, which we will require that human judges render for quite a long time to come. It's an example in which the human vs. computer question is not hypothetical. Parole decisions are made by judges in some countries, such as Israel, where researchers investigated how those decisions are influenced by the critical human issue of lunch. Over the course of a day, the judges approve about 35% of prisoners' applications for parole. But the approval rate declines steadily in the two hours before lunch, almost to zero just before the lunch break. Immediately after lunch, it spikes to 65% and then again declines steadily.

WHY ARE SO MANY MEN NOT WORKING?

The share of U.S. men in their prime working years who aren't employed has risen sharply since 1980, through recessions and expansions—a dramatic and unprecedented long-term shift in employment. Many economists believe that technological unemployment is an important factor in the trend, suggesting it's unlikely to turn around soon.



SOURCE: ST. LOUIS FED FROM OECD DATA

If you're a prisoner, the number of years you spend behind bars could be affected significantly by whether your parole application happens to be the last one on the judge's stack before lunch or the first one after. Data-driven algorithms have proved superior to human judges and juries in predicting recidivism, and it's virtually certain that computer analysis could judge parole applications more effectively, and certainly less capriciously, than human judges do. Yet how would you rate the chances of that job getting reassigned from judges to machines? The issue isn't computer abilities; it's the social necessity that individuals be accountable for important decisions. Similarly, it seems a safe bet that those in other accountability roles—CEOs, generals, government leaders at every level—will remain in those roles for the same reason.

HUMANS MUST WORK TOGETHER TO SET COLLECTIVE GOALS

In addition, humans rather than computers will have to solve some problems for purely practical reasons. It isn't because computers couldn't eventually solve them. It's because in real life, and especially in organizational life, we keep changing our conception of what the problem is and what our goals are. Those are issues that people must work out for themselves, and, critically, they must do it in groups. Partly that's because organizations include many constituencies that must be represented in problem solving, and partly it's because groups can solve problems far better than any individual can.

ONLY HUMANS CAN SATISFY DEEP INTERPERSONAL NEEDS

A more important category of people-only work comprises the tasks that we must do with or for other humans, not machines, simply because our most essential human nature demands it, for reasons too deep even to be articulated. We are social beings, hardwired from our evolutionary past to equate personal relationships with survival. We want to work with other people in solving problems, tell them stories and hear stories from them, create new ideas with them, because if we didn't do those things on the savanna 100,000 years ago, we died. The evidence is clear that the most effective groups are those whose members most strongly possess the most essentially, deeply human abilities—empathy above all, social sensitivity, storytelling, collaborating, solving problems together, building relationships. We developed these abilities of interaction with other people, not machines, not even emotion-sensing, emotion-expressing machines. We may enjoy the Pepper robot, but we didn't evolve to interact with it.

We want to follow human leaders, even if a computer could say all the right words, which is not an implausible prospect. We want to hear our diagnosis from a doctor, even if a computer supplied it, because we want to talk to the doctor about it—perhaps just to talk and know we're being heard by a human being. We want to negotiate important agreements with a person, hearing every quaver in his voice, noting when he crosses his arms, looking into his eyes.

To look into someone's eyes—that turns out to be, metaphorically and quite often literally, the key to high-value work in the coming economy.

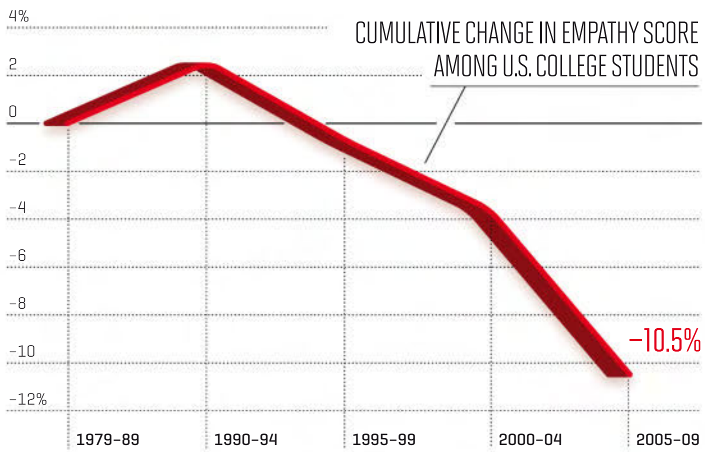
IT ISN'T JUST THEORY. Changes in the nature of work of exactly this type are happening on a significant scale. Ask employers which skills they'll need most in the next five to 10 years, as the Oxford Economics research firm did,

“Empathy is the critical 21st-century skill.”

—MEG BEAR, GROUP VICE PRESIDENT, ORACLE

AS DEMAND FOR EMPATHY GROWS, SUPPLY SHRINKS

Researchers analyzed 72 studies that measured empathy in about 14,000 college students since 1979 and found a broad decline over time. Their empathy seems unlikely to increase; separate research suggests this quality declines with age.



and the answers that come back do not include business acumen, analysis, or P&L management—left-brain thinking skills that computers handle well. Instead, employers’ top priorities include relationship building, teaming, co-creativity, brainstorming, cultural sensitivity, and ability to manage diverse employees—right-brain skills of social interaction. Those responses fit well with big-picture data on how Americans work today vs. how they worked in the 1970s. The biggest increases by far have been in education and health services, which have more than doubled as a percentage of total jobs; professional and business services, up about 80%; and leisure and hospitality, up about 50%. The overall trend is a giant employment increase in industries based on personal interaction. That’s why Oracle group vice president Meg Bear says, “Empathy is the critical 21st-century skill.”

Other research supports that impression. The McKinsey Global Institute found that from 2001 to 2009, transaction jobs (bank teller, checkout clerk) decreased by 700,000 in the U.S., and production jobs decreased by 2.7 million. But jobs of human interaction—doctors and teachers, for example—increased by 4.8 million. All those trends have continued. The institute reported that interaction jobs have become “the fastest-growing category of employment in advanced economies.”

No one should be surprised. Harvard professor William H. Bossert, a legendary figure at the school with wide-ranging interests in math and biology, taught a pioneering computer science course for undergraduates in the early 1970s, the first such course ever offered at Harvard. He devoted his final lecture to the future of computing and its likely effects. Intel had just produced its first chip, and people were worried about computers eliminating jobs. Bossert’s emphatic response was that computers would indeed eliminate jobs, and we should be grateful because we could then focus on the essence of being human, doing what we were meant to do. That observation led him to a memorable conclusion: “If you’re afraid that you might be replaced by a computer, then you probably can be—and should be.”

It has taken a while, but the large-scale takeover of many thinking tasks by computers, leaving people with the deeply human tasks of social interaction, is becoming a broad phenomenon.

Since the dawn of the Industrial Revolution—the machine age—much human success has derived from our being machine-like. For decades, most of the physical work in factories and the mental work in offices were repetitive and routine. They were designed to be that way; that’s why Henry Ford complained, “Why is it every time I ask for a pair of hands, they come with a brain attached?” It was the kind of work for machines to do, only the machines of the era couldn’t do it. The machines improved, slowly at first, then rapidly, driven by the ever-quickening advance of infotech. Now they can actually do most of the machine work of our world.

As a result, the meaning of great performance has changed.

SOURCE: SARAH KONRATH, EDWARD H. O’BRIEN, AND COURTNEY HSING, “CHANGES IN DISPOSITIONAL EMPATHY IN AMERICAN COLLEGE STUDENTS OVER TIME: A META-ANALYSIS,” *PERSONALITY AND SOCIAL PSYCHOLOGY REVIEW* (2010)

Being a great performer is becoming less about what you know and more about what you're like.

It used to be that you had to be good at being machine-like. Now, increasingly, you have to be good at being a person. Great performance requires us to be intensely human beings.

To put it another way: Being a great performer is becoming less about what you know and more about what you're like.

THE EMERGING PICTURE of the future casts conventional career advice in a new light, especially the nonstop urging that students study coding and STEM subjects—science, technology, engineering, math. It has been excellent advice for quite a while; eight of the 10 highest-paying college majors are in engineering, and those skills will remain critically important. But important isn't the same as high-value or well-paid. As infotech continues its advance into higher skills, value will continue to move elsewhere. Engineers will stay in demand, it's safe to say, but tomorrow's most valuable engineers will not be geniuses in cubicles; rather they'll be those who can build relationships, brainstorm, collaborate, and lead.

As a changing economy revalues human skills, it seems logical to see the trend as the latest step in a long progression: For centuries people have improved their living standards by mastering new skills that a new economy rewards. But the skills that are becoming most valuable now, the skills of deeply human interaction, are not like those other skills. Learning to be more socially sensitive is not like learning algebra or how to operate a lathe or how to make a well-functioning blog in WordPress. That means that some people will have a much easier time adapting than others will.

On average, women are better at many of these increasingly valuable skills than men are. Overall, they reliably score higher on tests of empathy and social sensitivity than men do. Since research shows that the best-performing groups tend to be those whose members are best at those skills, it follows that groups with a higher proportion of women tend to do better. In fact, some research shows that groups consisting entirely of women are more effective than groups that include even one man.

That doesn't mean that men are doomed to irrelevance. Within genders are enormous differences in the interpersonal abilities that people bring to adulthood, even before any training they may receive, which for most people is little or none. Everyone can get better, but it will be hard for some people, and some simply won't want to do it. It isn't about what they know. It's just the way they are.

Southwest Airlines once hired a high-level employee for its information technology operations and quickly began to suspect it had made a mistake. After he'd been on the job for only a week or so, the company's HR chief asked him how things were going.

"People here are strange," he replied. "They want to talk to me in the hallway! They ask how my day has been, and they really want to know! And I just want to go back to my cube and work."

An IT guy who wants to be left alone in his cube is not exactly a surprise. It's practically a stereotype. But it was a big problem at Southwest.

This company succeeds in one of the world's most miserable industries. It prospers because, as its managers have always understood, it knows the value of human interaction externally and internally. The ability of employees to engage customers with humor, energy, and generosity is crucial to creating value in an experience that is not, on its face, all that appealing. For employees who work strictly with one another behind the scenes, the business is as grindingly competitive as it is for any other airline, and doing the job is not a walk in the park. Co-workers who ask about each other and like to tell a joke are key to keeping everyone going.

So an employee who's uninterested in human interaction is trouble. His immediate depressive effect on those around him, bad enough by itself, could start to spread. Even if it doesn't, it's a problem. The company's culture is a big reason, maybe the main reason, that so many people want to work there. It's why, when the company has 3,000 jobs to fill, it gets 100,000 applications. If a newly hired young person comes to work on his first day and meets this guy, he'll conclude that the Southwest culture isn't at all what he had thought. He'll be unhappy, possibly resentful, and he'll spread the word.

So Southwest's managers decided that their new IT guy, despite his excellent credentials, had to go. He was dismissed in short order.

For people like him, life will be increasingly difficult. Organizations used to have places for them, in solid middle-class jobs in offices and factories. But those are the jobs that technology is already taking over rapidly. As the shift in valuable skills continues, organizations are finding not only that they have no jobs for the disengaged and socially inept, but also that such people are toxic to the enterprise and must be removed.

The Cleveland Clinic learned a similar lesson. Over the past five years it has developed a pathbreaking and dramatically effective program to train all employees and contractors in empathy and relationship building. The clinic found that a few of its people were in the wrong business. "Off-board people who don't belong," concluded Dr. James Merlino, who led the transformation effort. "One disengaged employee who does not support the organization or the mission can have negative consequences for an entire department. The hardworking and engaged employees will resent these people being around." When the human experience is what counts most, one wrong human is one more than you can afford.

The current transformation of how people create value is historically quite sudden. Most people's essential skills remained largely the same from the emergence of agriculture 12,000 years ago to the dawn of the Industrial Revolution in the mid-18th century. The transition to an industrial economy in the Western nations, and the accompanying shift in skill values, took well over 100 years. The subsequent turn to a knowledge-based economy took most of the 20th century. Now, as technology gallops ahead with longer strides every year, the transition to the newly valuable skills of empathizing, collaborating, creating, leading, and building relationships is happening faster than corporations, governments, education systems, or most human psyches can keep up with.

On average, women are better at many of these increasingly valuable skills than men are.

That's disorienting, and it gets more so as the fundamental nature of value shifts from what you know to what you're like.

As economies have evolved over the centuries, we've always looked outward to get the new skills we require, to elders, schools, trainers, and employers that knew and could teach us what we needed to know. Now, for the first time, we must also look inward. That's where we find the elements of the skills we need next. Developing those abilities will not be easy or comfortable for some, and it is likely to get harder for everyone, because as the abilities become more valuable, standards will rise. Even those who are good at them will have to get better.

If the prospect sounds worrying, it shouldn't. On the contrary, it's wonderful news. Just think of what we're being asked to do—to become more essentially human, to be the creatures we once were and were always meant to be. Odd as it may sound, that's a significant change from what we're used to. For the past 10 generations in the developed world, and shorter but still substantial periods in many emerging economies, most people have succeeded by learning to do machine work better than machines could do it. Now that era is ending. Machines are increasingly doing such work better than we ever could. We face at least the opportunity to create new and better lives.

Staking our futures to our profoundest human traits may feel strange and risky. Fear not. When you change perspectives and look inward rather than outward, you'll find that what you need next has been there all along. It has been there forever.

In the deepest possible sense, you've already got what it takes. Make of it what you will. ■

FEEDBACK *geoffrey_colvin@fortune.com*

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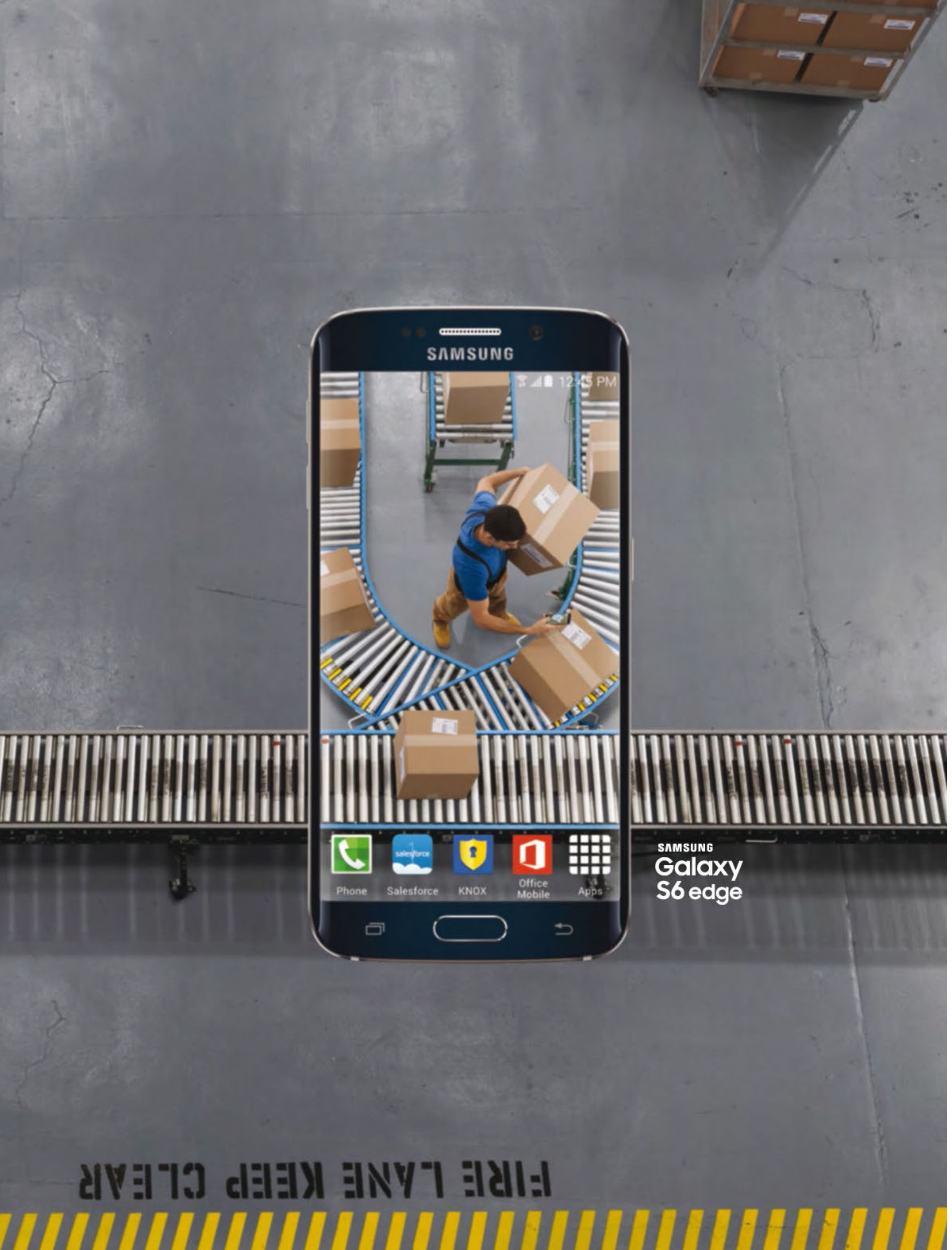
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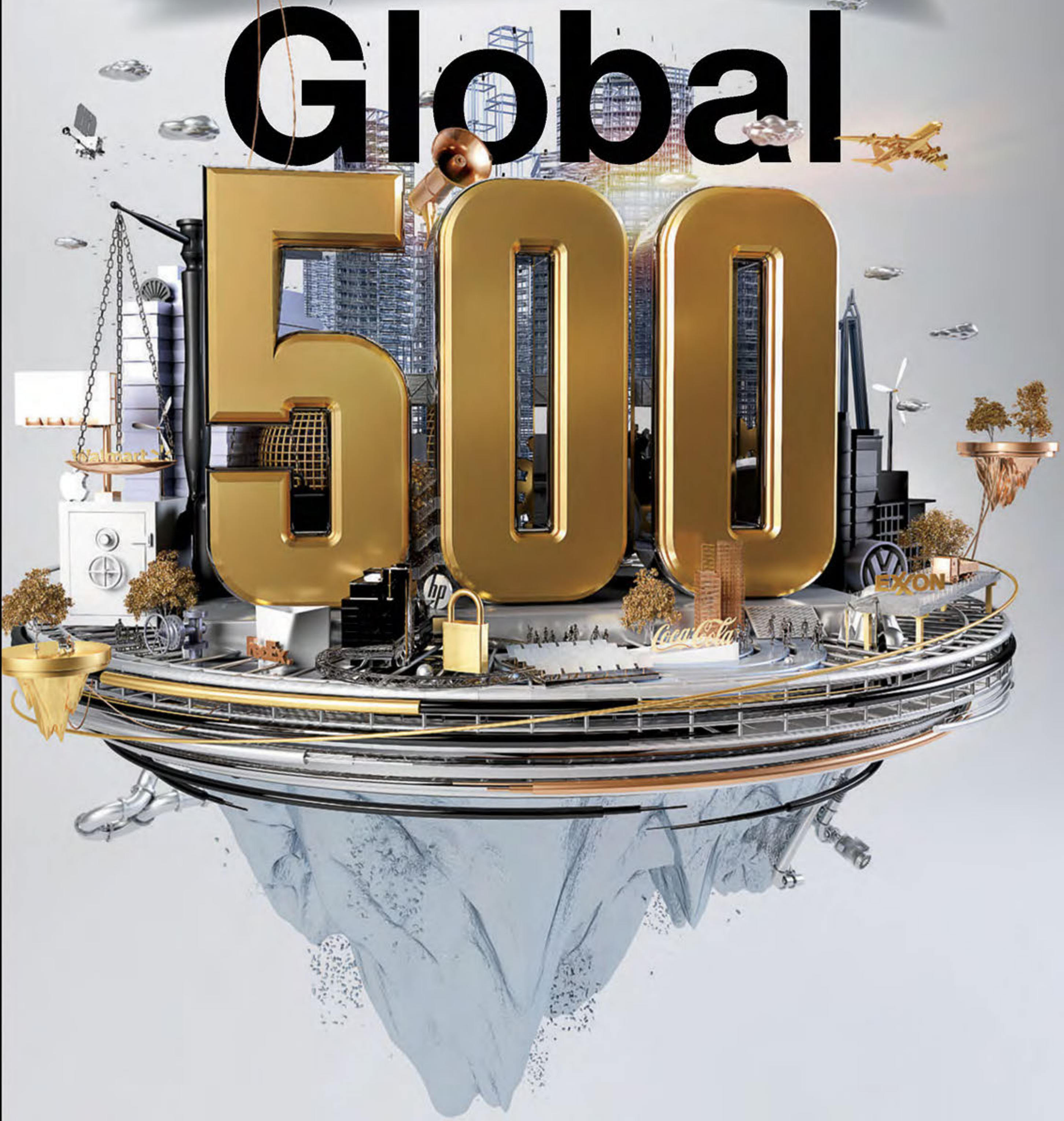
Global 500



THE WORLD'S LARGEST CORPORATIONS

FORTUNE Global 500

IT WAS A TOPSY-TURVY YEAR. Collectively, the 500 biggest companies in the world ranked by revenue set a new record in 2014 by generating $31.2 trillion in sales, a gain of 0.5% over 2013. But total profit for the Global 500 fell nearly 15% to $1.7 trillion. One major reason for the plunge was lower crude prices, which hit the oil and gas industry hard. Then there was the Fannie and Freddie factor: In 2013, U.S. mortgage giants Fannie Mae and Freddie Mac surged to a combined $133 billion in profit. That figure dropped to just $22 billion in 2014. The single biggest profitmaker was Industrial & Commercial Bank of China. Its $44.8 billion in net income outpaced even Apple's robust $39.5 billion profit. *—Brian O'Keefe*

INSIDE COVER ILLUSTRATIONS BY **VLADIMIR SHELEST(2), MOLI STUDIO,** AND **BEN FEARNLEY**

ILLUSTRATION BY MARTIN LAKSMAN

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• GLOBAL 500 • WORLD'S LARGEST CORPORATIONS

NO. 10
GLENCORE

Profits rebounded at the Swiss producer and trader of commodities as synergies from its 2013 merger with mining company Xstrata improved cash flow despite pressure on the prices of iron ore and copper. —*Jonathan Chew*

RANK 2014	2013			REVENUES $ millions	% change from 2013
1	1	WAL-MART STORES [1]	U.S.	485,651.0	2.0
2	3	SINOPEC GROUP [G]	CHINA	446,811.0[E]	(2.3)
3	2	ROYAL DUTCH SHELL [†,2]	NETHERLANDS	431,344.0[E]	(6.1)
4	4	CHINA NATIONAL PETROLEUM [G]	CHINA	428,620.0[¶,E]	(0.8)
5	5	EXXON MOBIL	U.S.	382,597.0[E]	(6.1)
6	6	BP [†]	BRITAIN	358,678.0[E]	(9.5)
7	7	STATE GRID [G]	CHINA	339,426.5	1.8
8	8	VOLKSWAGEN [†]	GERMANY	268,566.6	2.7
9	9	TOYOTA MOTOR [§,3]	JAPAN	247,702.9	(3.4)
10	10	GLENCORE [†,4]	SWITZERLAND	221,073.0	(5.0)
11	11	TOTAL [†]	FRANCE	212,018.0[E]	(7.0)
12	12	CHEVRON	U.S.	203,784.0[E]	(7.5)
13	13	SAMSUNG ELECTRONICS [†]	SOUTH KOREA	195,845.3	(6.3)
14	14	BERKSHIRE HATHAWAY	U.S.	194,673.0	6.9
15	15	APPLE [5]	U.S.	182,795.0	7.0
16	29	MCKESSON [3]	U.S.	181,241.0[¶]	31.3
17	20	DAIMLER [†]	GERMANY	172,279.1	10.0
18	25	INDUSTRIAL & COMMERCIAL BANK OF CHINA [†,G]	CHINA	163,174.9	9.7
19	24	EXOR GROUP [†]	ITALY	162,163.0	7.4
20	16	AXA [†]	FRANCE	161,173.4	(2.8)
21	21	GENERAL MOTORS	U.S.	155,929.0	0.3
22	18	E.ON [†]	GERMANY	151,460.5[¶]	(6.8)
23	19	PHILLIPS 66	U.S.	149,434.0[¶,E]	(7.3)
24	27	GENERAL ELECTRIC	U.S.	148,321.0[¶]	1.4
25	22	ENI [†]	ITALY	147,175.8[E]	(4.5)
26	17	GAZPROM [†,G]	RUSSIA	144,408.5	(12.5)
27	26	FORD MOTOR	U.S.	144,077.0	(1.9)
28	28	PETROBRAS [†,G]	BRAZIL	143,657.0[E]	1.6
29	38	CHINA CONSTRUCTION BANK [†,G]	CHINA	139,932.5	11.6
30	35	CVS HEALTH [6]	U.S.	139,367.0	9.9
31	32	HON HAI PRECISION INDUSTRY [†]	TAIWAN	139,039.4	4.4
32	31	ALLIANZ [†]	GERMANY	136,846.2	1.6
33	34	AT&T	U.S.	132,447.0	2.9
34	30	VALERO ENERGY	U.S.	130,844.0	(5.0)
35	39	UNITEDHEALTH GROUP	U.S.	130,474.0	6.5
36	47	AGRICULTURAL BANK OF CHINA [†,G]	CHINA	130,047.7	12.7
37	52	CHINA STATE CONSTRUCTION ENGINEERING [G]	CHINA	129,887.1	17.2
38	23	JAPAN POST HOLDINGS [G,3]	JAPAN	129,686.7	(14.8)
39	41	PDVSA [†,G]	VENEZUELA	128,439.0[E]	(4.4)
40	•	TRAFIGURA BEHEER [†,5]	NETHERLANDS	127,612.6	(4.1)
41	42	VERIZON COMMUNICATIONS	U.S.	127,079.0	5.4
42	40	BNP PARIBAS [†]	FRANCE	124,333.0	2.0
43	43	LUKOIL [§]	RUSSIA	122,803.0[E]	3.1
44	45	HONDA MOTOR [†,3]	JAPAN	121,221.5	(2.9)
45	59	BANK OF CHINA [†,G]	CHINA	120,946.0	14.5
46	88	AMERISOURCEBERGEN [5]	U.S.	119,569.1	34.1
47	36	PEMEX [†,G]	MEXICO	119,238.7	(5.3)
48	48	ASSICURAZIONI GENERALI [†]	ITALY	118,871.7[¶]	3.2
49	33	SOCIÉTÉ GÉNÉRALE [†]	FRANCE	118,232.3	(10.9)
50	37	FANNIE MAE [7]	U.S.	116,461.0	(7.3)
51	46	ROSNEFT OIL [†,G]	RUSSIA	113,663.3[E]	(2.9)
52	60	COSTCO WHOLESALE [8]	U.S.	112,640.0	7.1
53	50	HEWLETT-PACKARD [9]	U.S.	111,454.0	(0.8)
54	74	KROGER [1]	U.S.	108,465.0	10.3
55	55	CHINA MOBILE COMMUNICATIONS [G]	CHINA	107,529.4	(0.1)
56	68	BMW GROUP [†]	GERMANY	106,654.3	5.6
57	64	SK HOLDINGS [†]	SOUTH KOREA	106,248.0[¶,E]	4.0
58	83	CRÉDIT AGRICOLE [†]	FRANCE	106,198.0	13.4
59	61	NISSAN MOTOR [†,3]	JAPAN	103,459.6	(1.1)
60	85	SAIC MOTOR [G]	CHINA	102,248.6	11.1
61	57	J.P. MORGAN CHASE & CO.	U.S.	102,102.0	(3.9)
62	63	TESCO [†,10]	BRITAIN	101,580.3[¶]	(1.6)
63	58	SIEMENS [†,5]	GERMANY	101,560.3[¶]	(4.3)
64	65	CARREFOUR [†]	FRANCE	101,238.1	(0.5)
65	53	NIPPON TELEGRAPH & TELEPHONE [§,3]	JAPAN	100,913.9	(7.5)
66	62	EXPRESS SCRIPTS HOLDING	U.S.	100,887.1	(3.6)
67	73	BANCO SANTANDER [†]	SPAIN	100,706.2[¶]	2.2
68	69	PETRONAS [†,G]	MALAYSIA	100,618.8[E]	(0.1)
69	56	ENEL [†]	ITALY	100,539.0	(6.0)
70	72	NESTLÉ [†]	SWITZERLAND	100,115.7	0.7
71	•	CHINA RAILWAY ENGINEERING [G]	CHINA	99,537.9	9.1
72	79	CHINA NATIONAL OFFSHORE OIL [G]	CHINA	99,262.2	3.4
73	44	GDF SUEZ [†]	FRANCE	99,073.2	(16.4)
74	95	PRUDENTIAL [†]	BRITAIN	98,976.7	20.9
75	54	STATOIL [†,G]	NORWAY	98,801.4[E]	(8.9)
76	75	BASF [†]	GERMANY	98,595.7	0.4
77	76	NOBLE GROUP [†,11]	CHINA	97,604.6[¶]	(0.3)
78	70	ÉLECTRICITÉ DE FRANCE [†,G]	FRANCE	96,669.5	(3.7)
79	80	CHINA RAILWAY CONSTRUCTION [G]	CHINA	96,395.2	0.7
80	66	BANK OF AMERICA CORP.	U.S.	95,181.0	(6.4)
81	77	HSBC HOLDINGS [†]	BRITAIN	94,431.0	(3.2)
82	71	INTERNATIONAL BUSINESS MACHINES	U.S.	94,128.0[¶]	(5.6)
83	81	MARATHON PETROLEUM	U.S.	91,417.0[E]	(2.7)
84	67	CARDINAL HEALTH [12]	U.S.	91,084.0	(9.9)

Definitions, explanations, and footnotes are on page F-7.

DATA DIVE

WHEN CHINA SNEEZES?

With China's economy—a voracious consumer of metals—ratcheting back and industrial demand unsteady globally, copper prices have slid nearly 25% since September 2010.

RANK 2014	2013			REVENUES $ millions	% change from 2013
85	90	BOEING	U.S.	90,762.0	4.8
86	82	CITIGROUP	U.S.	90,646.0[¶]	(3.2)
87	122	CHINA DEVELOPMENT BANK [†,G]	CHINA	89,908.4	26.1
88	112	AMAZON.COM	U.S.	88,988.0	19.5
89	78	HITACHI [§,3]	JAPAN	88,786.9	(7.5)
90	89	WELLS FARGO	U.S.	88,372.0	0.3
91	49	ING GROUP [†]	NETHERLANDS	87,990.1[¶]	(23.0)
92	51	JX HOLDINGS [3]	JAPAN	87,779.9[E]	(20.9)
93	84	PTT [G]	THAILAND	87,299.3	(5.7)
94	98	CHINA LIFE INSURANCE [G]	CHINA	87,249.3	7.8
95	104	MICROSOFT [12]	U.S.	86,833.0	11.5
96	128	PING AN INSURANCE [†]	CHINA	86,021.8	25.6
97	91	METRO [†,5,13]	GERMANY	85,505.2	(1.0)
98	159	LEGAL & GENERAL GROUP [†]	BRITAIN	84,805.0	38.2
99	100	HYUNDAI MOTOR [†]	SOUTH KOREA	84,771.7	6.3
100	92	PROCTER & GAMBLE [12]	U.S.	84,537.0[¶]	0.4
101	102	HOME DEPOT [1]	U.S.	83,176.0	5.5
102	99	DEUTSCHE TELEKOM [†]	GERMANY	83,117.7	4.1
103	93	MUNICH RE GROUP [†]	GERMANY	81,685.1	(2.6)
104	87	ARCHER DANIELS MIDLAND	U.S.	81,201.0	(9.6)
105	107	SINOCHEM GROUP [G]	CHINA	80,635.0	6.2
106	103	AIRBUS GROUP [†]	NETHERLANDS	80,537.6	2.4
107	111	CHINA FAW GROUP [G]	CHINA	80,194.5	6.9
108	101	ARCELORMITTAL [†]	LUXEMBOURG	79,282.0	(0.2)
109	113	DONGFENG MOTOR GROUP [G]	CHINA	78,978.6	6.7
110	135	SOFTBANK GROUP [†,3]	JAPAN	78,857.2	18.5
111	110	DEUTSCHE POST [†]	GERMANY	77,795.7	2.7
112	138	ITAÚ UNIBANCO HOLDING [†]	BRAZIL	76,932.4	16.2
113	115	CHINA SOUTHERN POWER GRID [G]	CHINA	76,662.0	5.5
114	117	WALGREENS BOOTS ALLIANCE [8,14]	U.S.	76,392.0	5.8
115	143	CHINA RESOURCES NATIONAL [G]	CHINA	74,887.0	13.5
116	105	SONY [§,3]	JAPAN	74,724.9	(3.6)
117	116	TARGET [1]	U.S.	74,520.0[¶]	2.7
118	121	JOHNSON & JOHNSON	U.S.	74,331.0	4.2
119	96	INDIAN OIL [G,3]	INDIA	74,196.2[E]	(8.8)
120	120	ANTHEM [15]	U.S.	73,874.1	3.4
121	131	METLIFE	U.S.	73,316.0	7.5
122	118	ZURICH INSURANCE GROUP [†]	SWITZERLAND	72,569.0	0.7
123	157	AVIVA [†]	BRITAIN	71,602.8	16.5
124	162	GOOGLE	U.S.	71,487.0[¶]	17.9
125	124	MARUBENI [†,3]	JAPAN	71,254.3	1.2
126	125	BANCO DO BRASIL [†,G]	BRAZIL	71,184.8	17.4

RANK 2014	2013			REVENUES $ millions	% change from 2013
127	129	STATE FARM INSURANCE COS.	U.S.	71,159.8	4.2
128	119	PEUGEOT [†]	FRANCE	71,111.3	(1.0)
129	149	GROUPE AUCHAN [†]	FRANCE	70,908.3	11.1
130	123	PERTAMINA [G]	INDONESIA	70,648.4[E]	(0.6)
131	106	PANASONIC [§,3]	JAPAN	70,169.6	(9.1)
132	108	MITSUBISHI [†,3]	JAPAN	69,755.4	(8.5)
133	97	FREDDIE MAC [7]	U.S.	69,367.0	(14.6)
134	136	GROUPE BPCE [†,C]	FRANCE	68,986.2	3.9
135	146	COMCAST	U.S.	68,775.0	6.4
136	141	VODAFONE GROUP [†,3]	BRITAIN	67,944.6	3.0
137	134	U.S. POSTAL SERVICE [G,5]	U.S.	67,830.0	0.8
138	132	NIPPON LIFE INSURANCE [3]	JAPAN	67,396.1	(1.1)
139	142	BHP BILLITON [†,12]	AUSTRALIA	67,206.0	1.9
140	109	TELEFÓNICA [†]	SPAIN	66,826.6	(11.8)
141	137	PEPSICO	U.S.	66,683.0	0.4
142	164	DAI-ICHI LIFE INSURANCE [3]	JAPAN	65,960.4	9.3
143	168	CHINA POST GROUP [G]	CHINA	65,693.2	11.4
144	152	CHINA NORTH INDUSTRIES GROUP [G]	CHINA	65,615.1	4.7
145	94	LLOYDS BANKING GROUP [†]	BRITAIN	65,591.1	(21.1)
146	185	TEWOO GROUP [G]	CHINA	65,300.8	18.8
147	148	AEON [10]	JAPAN	65,273.4	1.6
148	•	FINATIS [†]	FRANCE	65,222.8	(0.4)
149	151	UNITED TECHNOLOGIES	U.S.	65,100.0	3.4
150	155	ROBERT BOSCH [†]	GERMANY	64,961.5[¶]	5.4
151	150	LOUIS DREYFUS COMMODITIES [†]	NETHERLANDS	64,719.0	1.8
152	127	AMERICAN INTERNATIONAL GROUP	U.S.	64,406.0	(6.2)
153	140	UNILEVER [†]	BRITAIN/NETH.	64,251.8	(2.8)
154	130	RWE [†]	GERMANY	63,912.2[¶]	(6.3)
155	156	AMÉRICA MÓVIL [†]	MEXICO	63,744.8	3.5
156	166	PACIFIC CONSTRUCTION GROUP	CHINA	63,369.1	6.3
157	145	TOSHIBA [§,16]	JAPAN	63,175.8	(2.7)
158	114	RELIANCE INDUSTRIES [3]	INDIA	62,803.9[E]	(14.4)
159	178	AVIATION INDUSTRY CORP. OF CHINA [G]	CHINA	62,287.7	10.3
160	154	CHINA TELECOMMUNICATIONS [G]	CHINA	62,147.6	0.2
161	139	TOKYO ELECTRIC POWER [G,3]	JAPAN	61,869.6	(6.5)
162	177	POSCO [†]	SOUTH KOREA	61,504.9	8.8
163	147	AEGON [†]	NETHERLANDS	61,468.7	(4.4)
164	163	DEUTSCHE BANK [†]	GERMANY	61,040.3	0.8
165	187	CHINA COMMUNICATIONS CONSTRUCTION [G]	CHINA	60,119.2	10.1
166	175	CNP ASSURANCES [†]	FRANCE	59,648.1	5.4
167	170	NOVARTIS [†]	SWITZERLAND	59,593.0[¶]	1.3
168	182	UNITED PARCEL SERVICE	U.S.	58,232.0	5.0

GRAPHIC SOURCES: BLOOMBERG; COMEX

169-336

NO. 257
AMERICAN AIRLINES

The airline has been flying high since its merger with USAirways was finally approved. With domestic travel surging and fuel prices plunging, the result has been 60% revenue growth and, for the first time since 2007, an annual profit.

RANK 2014	2013			REVENUES $ millions	% change from 2013
169	174	DOW CHEMICAL	U.S.	58,167.0	1.9
170	223	AETNA	U.S.	58,003.2	22.6
171	158	WESFARMERS [†,12]	AUSTRALIA	57,221.5¶	(6.7)
172	153	BUNGE [§,17]	U.S.	57,161.0	(8.6)
173	200	INTESA SANPAOLO [†]	ITALY	57,070.0	10.8
174	208	PEOPLE'S INSURANCE CO. OF CHINA [†,G]	CHINA	57,047.5	15.1
175	194	LG ELECTRONICS [†]	SOUTH KOREA	57,038.6¶	7.4
176	192	LOWE'S [1]	U.S.	56,223.0	5.3
177	186	SBERBANK [†,G]	RUSSIA	56,185.8	2.6
178	193	BAYER [†]	GERMANY	56,031.3	5.1
179	197	THYSSENKRUPP [†,5]	GERMANY	56,027.7	7.2
180	167	CONOCOPHILLIPS	U.S.	55,997.0¶	(5.8)
181	161	WOOLWORTHS [†,12]	AUSTRALIA	55,940.4	(8.0)
182	195	INTEL	U.S.	55,870.0	6.0
183	213	ENERGY TRANSFER EQUITY [P]	U.S.	55,691.0	14.2
184	176	SEVEN & I HOLDINGS [10]	JAPAN	55,686.8	(1.6)
185	203	BANCO BRADESCO [†]	BRAZIL	55,628.5	9.4
186	160	CITIC GROUP [G]	CHINA	55,325.7	(9.3)
187	181	CATERPILLAR	U.S.	55,184.0	(0.8)
188	126	REPSOL [†]	SPAIN	54,672.9[E]	(20.9)
189	196	ROCHE GROUP [†]	SWITZERLAND	54,494.7	3.9
190	217	BANK OF COMMUNICATIONS [†]	CHINA	54,464.2	12.7
191	190	RENAULT [†]	FRANCE	54,460.7	0.2
192	180	SAINT-GOBAIN [†]	FRANCE	54,459.4	(2.4)
193	212	KOREA ELECTRIC POWER [†,G]	SOUTH KOREA	54,252.9	10.6
194	264	PRUDENTIAL FINANCIAL	U.S.	54,123.0¶	30.5
195	171	BARCLAYS [†]	BRITAIN	53,850.7	(6.7)
196	165	SHENHUA GROUP [G]	CHINA	52,731.1	(11.9)
197	198	DEUTSCHE BAHN [†,G]	GERMANY	52,700.4	1.5
198	133	CHINA MINMETALS [G]	CHINA	52,383.1	(22.3)
199	189	ORANGE [†]	FRANCE	52,325.0	(3.8)
200	188	VINCI [†]	FRANCE	51,992.0	(4.5)
201	199	MITSUBISHI UFJ FINANCIAL GROUP [3]	JAPAN	51,282.3	(0.7)
202	251	JBS [†]	BRAZIL	51,176.0	18.9
203	202	ACS [†]	SPAIN	51,163.8¶	0.4
204	184	NIPPON STEEL & SUMITOMO METAL [3]	JAPAN	51,024.2	(7.3)
205	215	SSE [†,3]	BRITAIN	50,932.9	4.8
206	183	ITOCHU [†,3]	JAPAN	50,855.1	(8.8)
207	248	BEIJING AUTOMOTIVE GROUP [G]	CHINA	50,566.0	16.7
208	172	A.P. MØLLER-MÆRSK GROUP [†]	DENMARK	50,337.0¶	(12.5)
209	205	SABIC [G]	SAUDI ARABIA	50,155.2	(0.5)
210	209	HYUNDAI HEAVY INDUSTRIES [†]	SOUTH KOREA	49,940.4	0.9

RANK 2014	2013			REVENUES $ millions	% change from 2013
211	191	PFIZER	U.S.	49,605.0	(7.8)
212	•	MANULIFE FINANCIAL [†]	CANADA	49,371.2	172.4
213	173	MITSUI [†,3]	JAPAN	49,158.8	(14.1)
214	232	WALT DISNEY [5]	U.S.	48,813.0	8.4
215	228	SCHLUMBERGER [§,18]	U.S.	48,580.0	7.1
216	266	HUMANA	U.S.	48,500.0	17.4
217	263	CENTRICA [†]	BRITAIN	48,410.1	16.6
218	211	BAOSTEEL GROUP [G]	CHINA	48,323.4	(2.0)
219	207	INTERNATIONAL PETROLEUM INVESTMENT [†,G]	U.A.E.	48,130.0[E]	(3.2)
220	220	ENTERPRISE PRODUCTS PARTNERS [P]	U.S.	47,951.2	0.5
221	206	BANCO BILBAO VIZCAYA ARGENTARIA [†]	SPAIN	47,698.0	(4.5)
222	201	RIO TINTO GROUP [†]	BRITAIN	47,664.0	(6.9)
223	179	OMV GROUP [†]	AUSTRIA	47,639.7[E]	(15.4)
224	221	CHINA HUANENG GROUP [G]	CHINA	47,401.4	(0.6)
225	214	CISCO SYSTEMS [19]	U.S.	47,142.0	(3.0)
226	250	ANHEUSER-BUSCH INBEV [†]	BELGIUM	47,063.0[E]	9.0
227	210	CHINA UNITED NETWORK COMMUNICATIONS [G]	CHINA	46,834.8	(5.2)
228	285	HUAWEI INVESTMENT & HOLDING [†]	CHINA	46,774.1	20.3
229	234	SYSCO [12]	U.S.	46,516.7	4.7
230	256	INGRAM MICRO	U.S.	46,487.4	9.2
231	286	LENOVO GROUP [3]	CHINA	46,295.6	19.6
232	224	COCA-COLA	U.S.	45,998.0	(1.8)
233	237	CONTINENTAL [†]	GERMANY	45,772.8	3.4
234	279	SHANDONG WEIQIAO PIONEERING GROUP	CHINA	45,757.1	16.5
235	350	CHINA MERCHANTS BANK [†]	CHINA	45,613.8	33.7
236	240	LYONDELLBASELL INDUSTRIES [§]	NETHERLANDS	45,609.0¶	3.5
237	229	LOCKHEED MARTIN	U.S.	45,600.0	0.5
238	236	FEDEX [20]	U.S.	45,567.0	2.9
239	271	HEBEI IRON & STEEL GROUP [G]	CHINA	45,543.7	11.5
240	227	ALUMINUM CORP. OF CHINA [G]	CHINA	45,445.0	(0.0)
241	238	SANOFI [†]	FRANCE	45,246.6	2.3
242	246	KIA MOTORS [†]	SOUTH KOREA	44,730.7	2.9
243	225	SUMITOMO MITSUI FINANCIAL GROUP [3]	JAPAN	44,122.6	(4.8)
244	235	BOUYGUES [†]	FRANCE	44,100.5	(0.7)
245	254	JOHNSON CONTROLS [5]	U.S.	43,855.0¶	2.6
246	204	UNICREDIT GROUP [†]	ITALY	43,810.1¶	(13.8)
247	295	AMER INTERNATIONAL GROUP	CHINA	43,611.7	14.7
248	247	ROYAL AHOLD [†]	NETHERLANDS	43,514.2¶	0.1
249	257	PLAINS GP HOLDINGS [P]	U.S.	43,464.0	2.9
250	262	WORLD FUEL SERVICES	U.S.	43,386.4	4.4
251	222	FUJITSU [†,3]	JAPAN	43,231.3	(9.1)
252	239	WILMAR INTERNATIONAL	SINGAPORE	43,084.9	(2.3)

Definitions, explanations, and footnotes are on page F-7.

Building resiliency

DATA DIVE

CAPACITY RESTRAINT

As demand rebounded after the ravaging recession of 2008 and 2009, U.S. airlines have shown striking discipline (and historic profits) by increasing their capacity almost 15% (but not more) cumulatively.

RANK 2014	RANK 2013	Company	Country	REVENUES $ millions	% change from 2013
253	313	POWER CHINA [G]	CHINA	43,009.7	16.9
254	287	TATA MOTORS [3]	INDIA	42,975.4	11.6
255	233	CHS [C,8]	U.S.	42,664.0	(4.1)
256	245	MS&AD INSURANCE GROUP HOLDINGS [3]	JAPAN	42,653.3	(2.1)
257	452	AMERICAN AIRLINES GROUP	U.S.	42,650.0	59.5
258	268	GREENLAND HOLDING GROUP	CHINA	42,515.1	3.7
259	241	MERCK	U.S.	42,237.0	(4.1)
260	303	STATE BANK OF INDIA [G,3]	INDIA	42,074.9	12.1
261	289	CHRISTIAN DIOR [†,12,21]	FRANCE	42,031.0	9.4
262	230	BEST BUY [1]	U.S.	41,903.0[¶]	(7.3)
263	219	MEIJI YASUDA LIFE INSURANCE [3]	JAPAN	41,836.4	(12.3)
264	290	SHANXI COKING COAL GROUP [G]	CHINA	41,829.8	8.9
265	276	CHEMCHINA [G]	CHINA	41,813.3	5.3
266	216	NATIONAL AUSTRALIA BANK [†,5]	AUSTRALIA	41,710.9	(13.9)
267	249	KDDI [3]	JAPAN	41,593.5	(3.8)
268	258	VOLVO [†]	SWEDEN	41,230.1	(1.5)
269	226	COMMONWEALTH BANK OF AUSTRALIA [†,12]	AUSTRALIA	40,668.5	(11.6)
270	267	CHINA NATIONAL BUILDING MATERIALS GROUP [G]	CHINA	40,644.4	(0.9)
271	338	INDUSTRIAL BANK	CHINA	40,594.7	16.6
272	401	COFCO [G]	CHINA	40,524.5	31.8
273	299	DELTA AIR LINES	U.S.	40,362.0	6.9
274	308	JIANGSU SHAGANG GROUP	CHINA	40,334.4	8.7
275	283	HONEYWELL INTERNATIONAL	U.S.	40,306.0	3.2
276	357	SINOPHARM [G]	CHINA	40,105.7	20.5
277	294	HCA HOLDINGS	U.S.	40,087.0	5.4
278	270	GOLDMAN SACHS GROUP	U.S.	40,085.0	(1.9)
279	280	TESORO	U.S.	40,052.0[E]	2.2
280	242	BHARAT PETROLEUM [G,3]	INDIA	40,019.1[E]	(9.0)
281	330	CHINA MINSHENG BANKING [†]	CHINA	39,921.9	12.4
282	277	JARDINE MATHESON [†,11]	CHINA	39,921.0	1.2
283	244	IBERDROLA [†]	SPAIN	39,838.7	(8.5)
284	259	ABB [§]	SWITZERLAND	39,830.0	(4.8)
285	275	LUFTHANSA GROUP [†]	GERMANY	39,810.5	(0.1)
286	281	LIBERTY MUTUAL INSURANCE GROUP [22]	U.S.	39,796.0[¶]	1.7
287	367	GEORGE WESTON [†]	CANADA	39,769.0	22.0
288	278	SINOMACH [G]	CHINA	39,722.5	0.8
289	272	CREDIT SUISSE GROUP [§]	SWITZERLAND	39,669.5[¶]	(2.1)
290	261	TOKIO MARINE HOLDINGS [3]	JAPAN	39,363.8	(5.3)
291	273	MITSUBISHI ELECTRIC [§,3]	JAPAN	39,318.8	(2.8)
292	302	TALANX [†]	GERMANY	39,289.2	4.6
293	269	DENSO [†,3]	JAPAN	39,198.3	(4.1)
294	291	UNITED CONTINENTAL HOLDINGS	U.S.	38,901.0	1.6

RANK 2014	RANK 2013	Company	Country	REVENUES $ millions	% change from 2013
295	326	DZ BANK [†,C]	GERMANY	38,793.0	8.2
296	383	SHANGHAI PUDONG DEVELOPMENT BANK [†]	CHINA	38,683.8	22.8
297	324	NEW YORK LIFE INSURANCE	U.S.	38,680.4	7.4
298	425	POWER CORP. OF CANADA [†]	CANADA	38,601.7	34.2
299	296	ROYAL BANK OF CANADA [†,9]	CANADA	38,544.9	1.4
300	306	ORACLE [20]	U.S.	38,275.0	2.9
301	293	J. SAINSBURY [†,3]	BRITAIN	38,254.7	0.5
302	260	GS CALTEX [†]	SOUTH KOREA	38,235.6[E]	(8.3)
303	255	ROYAL BANK OF SCOTLAND GROUP [†]	BRITAIN	38,054.2[¶]	(10.6)
304	327	BOHAI STEEL GROUP [G]	CHINA	37,986.2	6.1
305	329	ALIMENTATION COUCHE-TARD [†,23]	CANADA	37,956.6	6.8
306	312	MORGAN STANLEY	U.S.	37,953.0	3.0
307	231	IDEMITSU KOSAN [3]	JAPAN	37,926.5[E]	(15.9)
308	274	UBS GROUP [†,24]	SWITZERLAND	37,883.8	0.1
309	265	GLAXOSMITHKLINE [†]	BRITAIN	37,871.5	(8.6)
310	336	POSTE ITALIANE [†,G]	ITALY	37,822.4	8.5
311	346	TYSON FOODS [5]	U.S.	37,580.0	9.0
312	218	VALE [†]	BRAZIL	37,539.0	(21.9)
313	311	SWISS RE [§]	SWITZERLAND	37,347.0	1.2
314	321	EDEKA ZENTRALE [C,25]	GERMANY	37,337.7	3.1
315	304	JIZHONG ENERGY GROUP [G]	CHINA	37,201.0	(0.5)
316	300	CPC [†,G]	TAIWAN	37,000.0[E]	(1.8)
317	282	SUNCOR ENERGY [†]	CANADA	36,664.8[E]	(6.3)
318	337	MAGNA INTERNATIONAL [§]	CANADA	36,641.0	5.2
319	355	MITSUBISHI HEAVY INDUSTRIES [3]	JAPAN	36,309.0	8.6
320	343	NATIONWIDE	U.S.	36,256.7	5.0
321	314	CHINA NATIONAL AVIATION FUEL GROUP [G]	CHINA	36,178.0	(1.5)
322	253	SNCF MOBILITÉS [†,G,26]	FRANCE	36,138.7	(15.5)
323	298	DEERE [9]	U.S.	36,066.9	(4.6)
324	320	DUPONT	U.S.	36,046.0	(1.2)
325	333	AMERICAN EXPRESS	U.S.	35,999.0	3.1
326	354	CHINA METALLURGICAL GROUP [G]	CHINA	35,807.5	6.3
327	284	HINDUSTAN PETROLEUM [G,3]	INDIA	35,724.2[E]	(8.3)
328	384	CHINA PACIFIC INSURANCE (GROUP)	CHINA	35,669.8	13.6
329	331	HANWHA [†]	SOUTH KOREA	35,574.9	0.6
330	288	WESTPAC BANKING [†,5]	AUSTRALIA	35,549.9	(7.7)
331	395	ACHMEA [†]	NETHERLANDS	35,545.7	14.7
332	340	KOREA GAS [†,G]	SOUTH KOREA	35,411.5	1.8
333	344	ALLSTATE	U.S.	35,239.0	2.1
334	292	CANON [§]	JAPAN	35,215.0	(7.9)
335	374	STANDARD LIFE [†]	BRITAIN	35,107.6[¶]	9.3
336	363	HUTCHISON WHAMPOA	CHINA	35,097.1	6.2

GRAPHIC SOURCE: BUREAU OF TRANSPORTATION STATISTICS

337-500

NO. 452
FUJI HEAVY INDUSTRIES

The Japanese maker of engines, aerospace parts, and Subaru cars sold a record 825,000 Imprezas, Foresters, and other vehicles. The aim now is to top 1.1 million–plus globally, with North America a top-priority market.

RANK 2014	2013			REVENUES $ millions	% change from 2013
337	316	JFE HOLDINGS [3]	JAPAN	35,019.7	(4.3)
338	371	CIGNA	U.S.	34,914.0	7.8
339	345	ZHEJIANG MATERIALS INDUSTRY GROUP [G]	CHINA	34,810.5	0.9
340	317	BRIDGESTONE	JAPAN	34,711.5	(5.1)
341	369	DATONG COAL MINE GROUP [G]	CHINA	34,704.2	6.9
342	349	CEFC CHINA ENERGY [†]	CHINA	34,699.4	1.7
343	297	CHINA GUODIAN [G]	CHINA	34,627.4	(8.5)
344	365	XINXING CATHAY INTERNATIONAL GROUP [G]	CHINA	34,497.9	5.2
345	368	CHINA HUADIAN [G]	CHINA	34,487.7	6.0
346	301	ECOPETROL [G]	COLOMBIA	34,438.9[E]	(8.6)
347	388	HYUNDAI MOBIS [†]	SOUTH KOREA	34,366.9	10.0
348	332	MONDELEZ INTERNATIONAL	U.S.	34,244.0	(3.0)
349	353	TIAA-CREF [27]	U.S.	34,230.3	1.2
350	362	SUMITOMO [†,3]	JAPAN	34,218.2	3.3
351	377	ENBRIDGE [§]	CANADA	34,088.6[¶]	6.6
352	243	INTL FCSTONE [5,28]	U.S.	34,063.3[¶]	(22.2)
353	323	PKN ORLEN GROUP [†]	POLAND	33,866.4[E]	(6.0)
354	381	JIANGXI COPPER [G]	CHINA	33,778.2	6.8
355	375	PEGATRON [†]	TAIWAN	33,652.5	5.2
356	356	MASSACHUSETTS MUTUAL LIFE INSURANCE	U.S.	33,572.4	0.7
357	361	TORONTO-DOMINION BANK [†,9]	CANADA	33,309.7	0.5
358	372	SHANXI LUAN MINING GROUP [G]	CHINA	33,290.4	3.0
359	319	TELECOM ITALIA [†]	ITALY	33,262.7[¶]	(8.9)
360	379	DIRECTV	U.S.	33,260.0	4.7
361	334	MITSUBISHI CHEMICAL HOLDINGS [3]	JAPAN	33,254.5	(4.8)
362	366	GUANGZHOU AUTOMOBILE INDUSTRY GROUP [G]	CHINA	33,237.4	1.4
363	335	L.M. ERICSSON [†]	SWEDEN	33,220.8	(4.9)
364	328	HENAN ENERGY & CHEMICAL [G]	CHINA	33,163.7	(7.3)
365	351	AIR FRANCE-KLM GROUP [†]	FRANCE	33,120.8[¶]	(2.8)
366	382	CHINA ELECTRONICS [G]	CHINA	33,084.9	5.0
367	387	SCHNEIDER ELECTRIC [†]	FRANCE	33,082.3	5.8
368	352	AUSTRALIA & NEW ZEALAND BANKING GROUP [†,5]	AUSTRALIA	32,905.0	(3.4)
369	412	HALLIBURTON	U.S.	32,870.0	11.8
370	360	GAS NATURAL FENOSA [†]	SPAIN	32,821.0	(1.0)
371	403	CHINA SHIPBUILDING INDUSTRY [G]	CHINA	32,732.6	7.4
372	342	SUMITOMO LIFE INSURANCE [3]	JAPAN	32,585.1	(5.7)
373	305	SHANDONG ENERGY GROUP [G]	CHINA	32,551.9	(12.9)
374	404	ACCENTURE [§,8]	IRELAND	31,874.7	4.9
375	318	TWENTY-FIRST CENTURY FOX [12]	U.S.	31,867.0	(12.9)
376	376	VEOLIA ENVIRONNEMENT [†]	FRANCE	31,831.8[¶]	3.8
377	399	3M	U.S.	31,821.0	3.1
378	380	CFE [†,G]	MEXICO	31,533.7	(0.4)
379	386	SHANXI JINCHENG ANTHRACITE COAL MINING [G]	CHINA	31,504.9	0.6
380	432	SHAANXI YANCHANG PETROLEUM (GROUP) [G]	CHINA	31,391.0[E]	11.5
381	341	KOÇ HOLDING [†]	TURKEY	31,376.3	(9.7)
382	309	JINNENG GROUP [G]	CHINA	31,317.8	(15.6)
383	322	SEARS HOLDINGS [1]	U.S.	31,198.0	(13.8)
384	358	KANSAI ELECTRIC POWER [3]	JAPAN	30,978.5	(6.7)
385	370	ROYAL PHILIPS [†]	NETHERLANDS	30,876.3[¶]	(4.8)
386	389	GENERAL DYNAMICS	U.S.	30,852.0	(1.2)
387	444	FRESENIUS [§,P]	GERMANY	30,816.6	14.2
388	418	PUBLIX SUPER MARKETS	U.S.	30,802.5	5.7
389	409	QUANTA COMPUTER [†]	TAIWAN	30,569.6	3.1
390	398	CHINA NONFERROUS METAL MINING (GROUP) [G]	CHINA	30,456.3	(1.4)
391	465	CHINA ENERGY ENGINEERING GROUP	CHINA	30,322.1	17.7
392	396	CHINA DATANG [G]	CHINA	30,206.9	(2.5)
393	385	FORMOSA PETROCHEMICAL [†]	TAIWAN	30,132.8[E]	(4.0)
394	347	RABOBANK GROUP [†,C]	NETHERLANDS	29,943.8	(12.8)
395	402	L'ORÉAL [†]	FRANCE	29,889.4	(2.0)
396	406	SOMPO JAPAN NIPPONKOA HOLDINGS [3,29]	JAPAN	29,853.5	(0.6)
397	423	MIGROS GROUP [†,C]	SWITZERLAND	29,825.4	3.4
398	390	PHILIP MORRIS INTERNATIONAL	U.S.	29,767.0[E]	(4.6)
399	415	MAPFRE GROUP [†]	SPAIN	29,733.0	1.6
400	394	KAILUAN GROUP [G]	CHINA	29,727.3	(4.3)
401	419	COOP GROUP [C]	SWITZERLAND	29,684.4	2.0
402	348	SHOUGANG GROUP [G]	CHINA	29,668.9	(13.5)
403	393	CHINA POWER INVESTMENT [G,30]	CHINA	29,584.7	(4.8)
404	443	VTB BANK [†,G]	RUSSIA	29,546.8	9.4
405	422	PHOENIX PHARMAHANDEL [†,1]	GERMANY	29,526.0	1.9
406	439	UNIPOL [†]	ITALY	29,520.2	7.9
407	407	DELHAIZE GROUP [†]	BELGIUM	29,482.1[¶]	(1.1)
408	364	LA POSTE [†,G]	FRANCE	29,399.9	(10.7)
409	391	YANGQUAN COAL INDUSTRY GROUP [G]	CHINA	29,397.5	(5.8)
410	436	TJX [1]	U.S.	29,078.4	6.0
411	421	BT GROUP [†,3]	BRITAIN	28,928.8	(0.4)
412	416	MIZUHO FINANCIAL GROUP [3]	JAPAN	28,924.7	(1.0)
413	325	VIVENDI [†]	FRANCE	28,923.7[¶]	(19.4)
414	430	ULTRAPAR HOLDINGS [†]	BRAZIL	28,774.6	1.9
415	408	TIME WARNER	U.S.	28,774.0[¶]	(3.4)
416	•	SHAANXI COAL & CHEMICAL INDUSTRY [G]	CHINA	28,665.6	16.9
417	426	BANK OF NOVA SCOTIA [†,9]	CANADA	28,606.6	0.3
418	437	COMPASS GROUP [†,5]	BRITAIN	28,247.7	3.1
419	428	CHUBU ELECTRIC POWER [3]	JAPAN	28,227.8	(0.5)
420	•	CHINA EVERBRIGHT GROUP [G]	CHINA	28,155.3	19.7

Definitions, explanations, and footnotes are on page F-7.

DATA DIVE

CARS REV UP

Global auto sales are accelerating, as turbocharged demand in the U.S. and Asia more than compensates for slackening results in Europe.

GRAPHIC SOURCE: IHS AUTOMOTIVE

RANK 2014	2013			REVENUES $ millions	% change from 2013
421	434	MACY'S [1]	U.S.	28,105.0	0.6
422	429	DANONE [†]	FRANCE	28,048.1	(0.8)
423	•	COMPAL ELECTRONICS [†]	TAIWAN	27,909.1	19.6
424	440	ENERGIE BADEN-WÜRTTEMBERG [†]	GERMANY	27,860.4	2.2
425	462	NIKE [20]	U.S.	27,799.0	7.6
426	469	CHINA GENERAL TECHNOLOGY [G]	CHINA	27,670.9	7.7
427	450	TECH DATA [1]	U.S.	27,670.6	3.2
428	•	TONENGENERAL SEKIYU	JAPAN	27,655.4[E]	(0.4)
429	449	MAZDA MOTOR [3]	JAPAN	27,593.9	2.7
430	474	AVNET [12]	U.S.	27,499.7	8.0
431	435	WM. MORRISON SUPERMARKETS [†,1]	BRITAIN	27,483.5	(0.8)
432	451	CHINA OCEAN SHIPPING [G]	CHINA	27,483.0	2.5
433	446	NORTHWESTERN MUTUAL	U.S.	27,465.0	1.8
434	433	MCDONALD'S	U.S.	27,441.3	(2.4)
435	479	EXELON	U.S.	27,429.0	10.2
436	414	SUZUKI MOTOR [3]	JAPAN	27,426.2	(6.5)
437	•	CHINA AEROSPACE & TECHNOLOGY [G]	CHINA	27,190.4	17.5
438	457	TRAVELERS COS.	U.S.	27,162.0	3.7
439	427	S-OIL [†]	SOUTH KOREA	27,122.7[E]	(4.7)
440	413	ANGLO AMERICAN [†]	BRITAIN	27,073.0	(7.7)
441	460	SAMSUNG C&T [†]	SOUTH KOREA	27,016.3	4.0
442	431	AISIN SEIKI [3]	JAPAN	26,957.8	(4.3)
443	484	INTERNATIONAL AIRLINES GROUP [†,31]	BRITAIN	26,756.1	8.5
444	405	NEC [3]	JAPAN	26,699.1	(12.1)
445	464	LOTTE SHOPPING [†]	SOUTH KOREA	26,687.7	3.5
446	461	ADECCO GROUP [§]	SWITZERLAND	26,530.6	2.5
447	473	RITE AID [10]	U.S.	26,528.4	3.9
448	480	QUALCOMM [5]	U.S.	26,487.0	6.5
449	424	OIL & NATURAL GAS [G,3]	INDIA	26,311.4[E]	(8.8)
450	420	INTERNATIONAL PAPER	U.S.	26,221.0[¶]	(9.8)
451	475	ANSTEEL GROUP [G]	CHINA	26,212.9	3.9
452	494	FUJI HEAVY INDUSTRIES [3]	JAPAN	26,175.1	8.9
453	459	FLEXTRONICS INTERNATIONAL [§,3]	SINGAPORE	26,147.9	0.2
454	411	MEDIPAL HOLDINGS [3]	JAPAN	26,129.6	(11.2)
455	468	ASTRAZENECA [†]	BRITAIN	26,095.0	1.5
456	458	SAMSUNG LIFE INSURANCE [†]	SOUTH KOREA	26,048.4	(0.5)
457	•	CHINA POLY GROUP [G]	CHINA	26,046.6	21.5
458	448	MICHELIN [†]	FRANCE	25,937.6	(3.5)
459	467	OCCIDENTAL PETROLEUM	U.S.	25,898.0[¶]	0.6
460	373	GASTERRA [G]	NETHERLANDS	25,868.4	(19.8)
461	471	SUMITOMO ELECTRIC INDUSTRIES [3]	JAPAN	25,674.0	0.1
462	485	DUKE ENERGY	U.S.	25,673.0[¶]	4.4

RANK 2014	2013			REVENUES $ millions	% change from 2013
463	463	HEINEKEN HOLDING [†]	NETHERLANDS	25,668.4[E]	(0.5)
464	•	HNA GROUP	CHINA	25,646.4	36.4
465	447	DAIWA HOUSE INDUSTRY [3]	JAPAN	25,563.9	(5.2)
466	397	OLD MUTUAL [†]	BRITAIN	25,479.2	(17.7)
467	•	AIA GROUP [†,32]	CHINA	25,433.0	16.0
468	455	BAE SYSTEMS [†]	BRITAIN	25,400.2	(3.6)
469	490	TUI [†,5]	GERMANY	25,385.9	4.7
470	417	SHARP [3]	JAPAN	25,341.5	(13.3)
471	•	CATHAY LIFE INSURANCE [†]	TAIWAN	25,322.8	12.9
472	•	TAIWAN SEMICONDUCTOR MFG. [†]	TAIWAN	25,173.5	25.1
473	481	LG DISPLAY [†]	SOUTH KOREA	25,126.3	1.7
474	•	GREENERGY FUELS HOLDINGS [†,23]	BRITAIN	25,116.0	9.6
475	497	CRH [†]	IRELAND	25,087.3	4.8
476	445	EAST JAPAN RAILWAY [3]	JAPAN	25,067.8	(7.1)
477	466	ZHEJIANG GEELY HOLDING GROUP	CHINA	24,986.4	(3.0)
478	•	GILEAD SCIENCES	U.S.	24,890.0	122.2
479	470	STANDARD CHARTERED [†]	BRITAIN	24,787.0	(3.5)
480	477	PERUSAHAAN LISTRIK NEGARA [G]	INDONESIA	24,686.9	(1.4)
481	453	TELSTRA [†,12]	AUSTRALIA	24,640.4[¶]	(7.5)
482	441	ALSTOM [†,3]	FRANCE	24,564.9[¶]	(9.6)
483	•	BAKER HUGHES	U.S.	24,551.0	9.8
484	482	EMERSON ELECTRIC [5]	U.S.	24,537.0	(0.5)
485	493	SODEXO [†,8]	FRANCE	24,512.4	1.9
486	•	NATIONAL GRID [†,3]	BRITAIN	24,458.9	4.0
487	•	EMC	U.S.	24,440.0	5.2
488	•	ZF FRIEDRICHSHAFEN [†]	GERMANY	24,428.0	9.3
489	378	LANDESBANK BADEN-WÜRTTEMBERG [†,G]	GERMANY	24,276.8	(23.7)
490	410	ONEX [†]	CANADA	24,219.0[¶]	(18.3)
491	454	VATTENFALL [†,G]	SWEDEN	24,180.8	(8.3)
492	•	UNITED SERVICES AUTOMOBILE ASSN. [22]	U.S.	24,032.7	14.6
493	•	UNION PACIFIC	U.S.	23,988.0	9.2
494	483	NORTHROP GRUMMAN	U.S.	23,979.0	(2.8)
495	•	ALCOA	U.S.	23,906.0	3.8
496	492	CAPITAL ONE FINANCIAL	U.S.	23,877.0[¶]	(1.2)
497	488	ANTARCHILE [†]	CHILE	23,846.5	(2.1)
498	489	ROLLS-ROYCE HOLDINGS [†]	BRITAIN	23,785.3[¶]	(1.9)
499	400	COSMO OIL [3]	JAPAN	23,734.6[E]	(23.1)
500	310	WUHAN IRON & STEEL [G]	CHINA	23,720.9	(35.8)
		TOTAL		31,212,127.6	

Notes

• GLOBAL 500 • WORLD'S LARGEST CORPORATIONS

DEFINITIONS AND EXPLANATIONS

METHODOLOGY

Companies are ranked by total revenues for their respective fiscal years ended on or before March 31, 2015. All companies on the list must publish financial data and report part or all of their figures to a government agency. Figures are as reported, and comparisons are with the prior year's figures as originally reported for that year. *Fortune* does not restate the prior year's figures for changes in accounting.

REVENUES

Revenue figures include consolidated subsidiaries and reported revenues from discontinued operations, but exclude excise taxes. For banks, revenue is the sum of gross interest income and gross noninterest income. For insurance companies, revenue includes premium and annuity income, investment income, realized capital gains or losses, and other income, but excludes deposits. Revenues for non-U.S. companies have been converted to U.S. dollars at the average exchange rate during each company's fiscal year.

CREDITS

This year's *Fortune* Global 500 was prepared under the direction of list editor Scott DeCarlo. Financial statements and annual reports were reviewed by reporter Douglas Elam, accounting specialists Richard Tucksmith and Rhona Altschuler, and markets editor Kathleen Smyth. Reporter Cindy Kano (Tokyo) reviewed and verified figures for Japanese companies. *Fortune* Global 500 regional contact Zhang Dan provided figures for Chinese companies. *Fortune*'s Business Information Database administrator, Larry Shine, supplied the technical support. Edith Fried reviewed and edited nonstatistical information. Researchers Viki Goldman and Kathleen Lyons assisted in data verification using data provided by FactSet Research Systems, Hoover's, Morningstar Document Research, S&P Capital IQ, and Thomson Reuters.

FOOTNOTES

[†] Figures prepared in accordance with International Accounting Standards.
[§] Figures prepared in accordance with U.S. Generally Accepted Accounting Principles.
[¶] Includes revenues from discontinued operations.
[C] A cooperative.
[E] Excise taxes have been deducted.
[G] Government owned 50% or more.
[P] A partnership.
[1] Figures are for fiscal year ended Jan. 31, 2015.
[2] Company is incorporated in Britain. Executive offices are in the Netherlands.
[3] Figures are for fiscal year ended March 31, 2015.
[4] Company is incorporated in Jersey. Executive offices are in Switzerland.
[5] Figures are for fiscal year ended Sept. 30, 2014.
[6] Changed name from CVS Caremark, Sept. 3, 2014.
[7] Company's senior preferred stock is owned by the U.S. Treasury, which also holds a warrant to purchase 79.9% of the common stock.
[8] Figures are for fiscal year ended Aug. 31, 2014.
[9] Figures are for fiscal year ended Oct. 31, 2014.
[10] Figures are for fiscal year ended Feb. 28, 2015.
[11] Company is incorporated in Bermuda. Executive offices are in Hong Kong.
[12] Figures are for fiscal year ended June 30, 2014.
[13] Changed fiscal year-end from Dec. 31 to Sept. 30. Comparison is with figures for the 12 months ended Dec. 31, 2013.
[14] Reorganized as a holding company after acquiring the remaining 55% of Alliance Boots (Switzerland), Dec. 31, 2014. Financial figures are for Walgreen, now a subsidiary of the company.
[15] Changed name from WellPoint, Dec. 3, 2014.
[16] Company's investigation into accounting irregularities for overstated profits delayed annual results. Revenues are for 12 months ended Dec. 31, 2014. Comparison is with fiscal year ended March 31, 2014.
[17] Company is incorporated in Bermuda. Executive offices are in the U.S.
[18] Company is incorporated in Curaçao. Executive offices are in the U.S.
[19] Figures are for fiscal year ended July 31, 2014.
[20] Figures are for fiscal year ended May 31, 2014.
[21] Changed fiscal year-end from April 30 to June 30. Comparison is with fiscal year ended April 30, 2013.
[22] A mutual company, not a stock company. It is grouped with stock companies because it reports according to Generally Accepted Accounting Principles.
[23] Figures are for fiscal year ended April 30, 2014.
[24] Established a holding company and changed name from UBS, Dec. 31, 2014.
[25] Figures include operations for entire cooperative, including members.
[26] Changed name from Société Nationale des Chemins de Fers Français, Jan. 1, 2015.
[27] Not a mutual company, but reports financial data according to statutory accounting.
[28] Company reports sale of physical commodities on a gross basis.
[29] Changed name from NKSJ Holdings, Sept. 1, 2014.
[30] The restructuring of the company has been approved, and once completed it will be renamed State Power Investment.
[31] Company is incorporated in Spain. Executive offices are in Britain.
[32] Figures are for fiscal year ended Nov. 30, 2014.

Company Country	Global 500 rank
ABB SWITZERLAND	284
ACCENTURE IRELAND	374
ACHMEA NETHERLANDS	331
ACS SPAIN	203
ADECCO GROUP SWITZERLAND	446
AEGON NETHERLANDS	163
AEON JAPAN	147
AETNA U.S.	170
AGRICULTURAL BANK OF CHINA CHINA	36
AIA GROUP CHINA	467
AIRBUS GROUP NETHERLANDS	106
AIR FRANCE-KLM GROUP FRANCE	365
AISIN SEIKI JAPAN	442
ALCOA U.S.	495
ALIMENTATION COUCHE-TARD CANADA	305
ALLIANZ GERMANY	32
ALLSTATE U.S.	333
ALSTOM FRANCE	482
ALUMINUM CORP. OF CHINA CHINA	240
AMAZON.COM U.S.	88
AMÉRICA MÓVIL MEXICO	155
AMERICAN AIRLINES GROUP U.S.	257
AMERICAN EXPRESS U.S.	325
AMERICAN INTERNATIONAL GROUP U.S.	152
AMER INTERNATIONAL GROUP CHINA	247
AMERISOURCEBERGEN U.S.	46
ANGLO AMERICAN BRITAIN	440
ANHEUSER-BUSCH INBEV BELGIUM	226
ANSTEEL GROUP CHINA	451
ANTARCHILE CHILE	497
ANTHEM U.S.	120
APPLE U.S.	15
ARCELORMITTAL LUXEMBOURG	108
ARCHER DANIELS MIDLAND U.S.	104
ASSICURAZIONI GENERALI ITALY	48
ASTRAZENECA BRITAIN	455
AT&T U.S.	33
AUSTRALIA & NEW ZEAL. BNKG. AUSTRALIA	368
AVIATION INDUSTRY CORP. OF CHINA CHINA	159
AVIVA BRITAIN	123
AVNET U.S.	430
AXA FRANCE	20
BAE SYSTEMS BRITAIN	468
BAKER HUGHES U.S.	483
BANCO BILBAO VIZCAYA ARGENTARIA SPAIN	221
BANCO BRADESCO BRAZIL	185
BANCO DO BRASIL BRAZIL	126
BANCO SANTANDER SPAIN	67
BANK OF AMERICA CORP. U.S.	80
BANK OF CHINA CHINA	45
BANK OF COMMUNICATIONS CHINA	190
BANK OF NOVA SCOTIA CANADA	417
BAOSTEEL GROUP CHINA	218
BARCLAYS BRITAIN	195
BASF GERMANY	76
BAYER GERMANY	178
BEIJING AUTOMOTIVE GROUP CHINA	207
BERKSHIRE HATHAWAY U.S.	14
BEST BUY U.S.	262
BHARAT PETROLEUM INDIA	280
BHP BILLITON AUSTRALIA	139
BMW GERMANY	56
BNP PARIBAS FRANCE	42
BOEING U.S.	85
BOHAI STEEL GROUP CHINA	304
BOSCH (ROBERT) GERMANY	150
BOUYGUES FRANCE	244
BP BRITAIN	6
BRIDGESTONE JAPAN	340
BT GROUP BRITAIN	411
BUNGE U.S.	172
CANON JAPAN	334
CAPITAL ONE FINANCIAL U.S.	496
CARDINAL HEALTH U.S.	84
CARREFOUR FRANCE	64
CATERPILLAR U.S.	187
CATHAY LIFE INSURANCE TAIWAN	471
CEFC CHINA ENERGY CHINA	342
CENTRICA BRITAIN	217
CFE MEXICO	378
CHEMCHINA CHINA	265
CHEVRON U.S.	12
CHINA AEROSPACE & TECHNOLOGY CHINA	437

CHINA COMMUNICATIONS CONSTR. CHINA	165
CHINA CONSTRUCTION BANK CHINA	29
CHINA DATANG CHINA	392
CHINA DEVELOPMENT BANK CHINA	87
CHINA ELECTRONICS CHINA	366
CHINA ENERGY ENGINEERING CHINA	391
CHINA EVERBRIGHT GROUP CHINA	420
CHINA FAW GROUP CHINA	107
CHINA GENERAL TECHNOLOGY CHINA	426
CHINA GUODIAN CHINA	343
CHINA HUADIAN CHINA	345
CHINA HUANENG GROUP CHINA	224
CHINA LIFE INSURANCE CHINA	94
CHINA MERCHANTS BANK CHINA	235
CHINA METALLURGICAL GROUP CHINA	326
CHINA MINMETALS CHINA	198
CHINA MINSHENG BANKING CHINA	281
CHINA MOBILE COMMUNICATIONS CHINA	55
CHINA NATIONAL AVIATION FUEL GROUP CHINA	321
CHINA NATIONAL BLDG. MATERIALS GROUP CHINA	270
CHINA NATIONAL OFFSHORE OIL CHINA	72
CHINA NATIONAL PETROLEUM CHINA	4
CHINA NONFERROUS METAL MINING CHINA	390
CHINA NORTH INDUSTRIES CHINA	144
CHINA OCEAN SHIPPING CHINA	432
CHINA PACIFIC INSURANCE CHINA	328
CHINA POLY GROUP CHINA	457
CHINA POST GROUP CHINA	143
CHINA POWER INVESTMENT CHINA	403
CHINA RAILWAY CONSTRUCTION CHINA	79
CHINA RAILWAY ENGINEERING CHINA	71
CHINA RESOURCES NATIONAL CHINA	115
CHINA SHIPBUILDING INDUSTRY CHINA	371
CHINA SOUTHERN POWER GRID CHINA	113
CHINA STATE CONSTR. ENGINEERING CHINA	37
CHINA TELECOMMUNICATIONS CHINA	160
CHINA UNITED NTWK. COMMUNICATIONS CHINA	227
CHS U.S.	255
CHUBU ELECTRIC POWER JAPAN	419
CIGNA U.S.	338
CISCO SYSTEMS U.S.	225
CITIC GROUP CHINA	186
CITIGROUP U.S.	86
CNP ASSURANCES FRANCE	166
COCA-COLA U.S.	232
COFCO CHINA	272
COMCAST U.S.	135
COMMONWEALTH BANK AUSTRALIA	269
COMPAL ELECTRONICS TAIWAN	423
COMPASS GROUP BRITAIN	418
CONOCOPHILLIPS U.S.	180
CONTINENTAL GERMANY	233
COOP GROUP SWITZERLAND	401
COSMO OIL JAPAN	499
COSTCO WHOLESALE U.S.	52
CPC TAIWAN	316
CRÉDIT AGRICOLE FRANCE	58
CREDIT SUISSE GROUP SWITZERLAND	289
CRH IRELAND	475
CVS HEALTH U.S.	30
DAI-ICHI LIFE INSURANCE JAPAN	142
DAIMLER GERMANY	17
DAIWA HOUSE INDUSTRY JAPAN	465
DANONE FRANCE	422
DATONG COAL MINE GROUP CHINA	341
DEERE U.S.	323
DELHAIZE GROUP BELGIUM	407
DELTA AIR LINES U.S.	273
DENSO JAPAN	293
DEUTSCHE BAHN GERMANY	197
DEUTSCHE BANK GERMANY	164
DEUTSCHE POST GERMANY	111
DEUTSCHE TELEKOM GERMANY	102
DIOR (CHRISTIAN) FRANCE	261
DIRECTV U.S.	360
DISNEY (WALT) U.S.	214
DONGFENG MOTOR GROUP CHINA	109
DOW CHEMICAL U.S.	169
DUKE ENERGY U.S.	462
DUPONT U.S.	324
DZ BANK GERMANY	295
EAST JAPAN RAILWAY JAPAN	476
ECOPETROL COLOMBIA	346
EDEKA ZENTRALE GERMANY	314

ÉLECTRICITÉ DE FRANCE FRANCE	78
EMC U.S.	487
EMERSON ELECTRIC U.S.	484
ENBRIDGE CANADA	351
ENEL ITALY	69
ENERGIE BADEN-WÜRTTEMBERG GERMANY	424
ENERGY TRANSFER EQUITY U.S.	183
ENI ITALY	25
ENTERPRISE PRODUCTS U.S.	220
E.ON GERMANY	22
ERICSSON (L.M.) SWEDEN	363
EXELON U.S.	435
EXOR GROUP ITALY	19
EXPRESS SCRIPTS HOLDING U.S.	66
EXXON MOBIL U.S.	5
FANNIE MAE U.S.	50
FEDEX U.S.	238
FINATIS FRANCE	148
FLEXTRONICS INTERNATIONAL SINGAPORE	453
FORD MOTOR U.S.	27
FORMOSA PETROCHEMICAL TAIWAN	393
FREDDIE MAC U.S.	133
FRESENIUS GERMANY	387
FUJI HEAVY INDUSTRIES JAPAN	452
FUJITSU JAPAN	251
GAS NATURAL FENOSA SPAIN	370
GASTERRA NETHERLANDS	460
GAZPROM RUSSIA	26
GDF SUEZ FRANCE	73
GENERAL DYNAMICS U.S.	386
GENERAL ELECTRIC U.S.	24
GENERAL MOTORS U.S.	21
GILEAD SCIENCES U.S.	478
GLAXOSMITHKLINE BRITAIN	309
GLENCORE SWITZERLAND	10
GOLDMAN SACHS GROUP U.S.	278
GOOGLE U.S.	124
GREENERGY FUELS HOLDINGS BRITAIN	474
GREENLAND HOLDING GROUP CHINA	258
GROUPE AUCHAN FRANCE	129
GROUPE BPCE FRANCE	134
GS CALTEX SOUTH KOREA	302
GUANGZHOU AUTO. INDUSTRY GROUP CHINA	362
HALLIBURTON U.S.	369
HANWHA SOUTH KOREA	329
HCA HOLDINGS U.S.	277
HEBEI IRON & STEEL GROUP CHINA	239
HEINEKEN HOLDING NETHERLANDS	463
HENAN ENERGY & CHEMICAL CHINA	364
HEWLETT-PACKARD U.S.	53
HINDUSTAN PETROLEUM INDIA	327
HITACHI JAPAN	89
HNA GROUP CHINA	464
HOME DEPOT U.S.	101
HONDA MOTOR JAPAN	44
HONEYWELL INTERNATIONAL U.S.	275
HON HAI PRECISION INDUSTRY TAIWAN	31
HSBC HOLDINGS BRITAIN	81
HUAWEI INVESTMENT & HOLDING CHINA	228
HUMANA U.S.	216
HUTCHISON WHAMPOA CHINA	336
HYUNDAI HEAVY INDUSTRIES SOUTH KOREA	210
HYUNDAI MOBIS SOUTH KOREA	347
HYUNDAI MOTOR SOUTH KOREA	99
IBERDROLA SPAIN	283
IDEMITSU KOSAN JAPAN	307
INDIAN OIL INDIA	119
INDUSTRIAL BANK CHINA	271
INDUSTRIAL & COMMER. BANK OF CHINA CHINA	18
ING GROUP NETHERLANDS	91
INGRAM MICRO U.S.	230
INTEL U.S.	182
INTERNATIONAL AIRLINES GROUP BRITAIN	443
INTERNATIONAL BUSINESS MACHINES U.S.	82
INTERNATIONAL PAPER U.S.	450
INTERNATIONAL PETROLEUM INVESTMENT U.A.E.	219
INTESA SANPAOLO ITALY	173
INTL FCSTONE U.S.	352
ITAÚ UNIBANCO HOLDING BRAZIL	112
ITOCHU JAPAN	206
JAPAN POST HOLDINGS JAPAN	38
JARDINE MATHESON CHINA	282
JBS BRAZIL	202
JFE HOLDINGS JAPAN	337

JIANGSU SHAGANG GROUP CHINA	274
JIANGXI COPPER CHINA	354
JINNENG GROUP CHINA	382
JIZHONG ENERGY GROUP CHINA	315
JOHNSON CONTROLS U.S.	245
JOHNSON & JOHNSON U.S.	118
JX HOLDINGS JAPAN	92
KAILUAN GROUP CHINA	400
KANSAI ELECTRIC POWER JAPAN	384
KDDI JAPAN	267
KIA MOTORS SOUTH KOREA	242
KOÇ HOLDING TURKEY	381
KOREA ELECTRIC POWER SOUTH KOREA	193
KOREA GAS SOUTH KOREA	332
KROGER U.S.	54
LANDESBANK BADEN-WÜRTTEMBERG GER.	489
LA POSTE FRANCE	408
LEGAL & GENERAL GROUP BRITAIN	98
LENOVO GROUP CHINA	231
LG DISPLAY SOUTH KOREA	473
LG ELECTRONICS SOUTH KOREA	175
LIBERTY MUTUAL INSURANCE GROUP U.S.	286
LLOYDS BANKING GROUP BRITAIN	145
LOCKHEED MARTIN U.S.	237
L'ORÉAL FRANCE	395
LOTTE SHOPPING SOUTH KOREA	445
LOUIS DREYFUS COMMODITIES NETH.	151
LOWE'S U.S.	176
LUFTHANSA GROUP GERMANY	285
LUKOIL RUSSIA	43
LYONDELLBASELL INDUSTRIES NETH.	236
MACY'S U.S.	421
MAGNA INTERNATIONAL CANADA	318
MANULIFE FINANCIAL CANADA	212
MAPFRE GROUP SPAIN	399
MARATHON PETROLEUM U.S.	83
MARUBENI JAPAN	125
MASSACHUSETTS MUTUAL LIFE U.S.	356
MAZDA MOTOR JAPAN	429
MCDONALD'S U.S.	434
MCKESSON U.S.	16
MEDIPAL HOLDINGS JAPAN	454
MEIJI YASUDA LIFE INSURANCE JAPAN	263
MERCK U.S.	259
METLIFE U.S.	121
METRO GERMANY	97
MICHELIN FRANCE	458
MICROSOFT U.S.	95
MIGROS GROUP SWITZERLAND	397
MITSUBISHI JAPAN	132
MITSUBISHI CHEMICAL HOLDINGS JAPAN	361
MITSUBISHI ELECTRIC JAPAN	291
MITSUBISHI HEAVY INDUSTRIES JAPAN	319
MITSUBISHI UFJ FINANCIAL GROUP JAPAN	201
MITSUI JAPAN	213
MIZUHO FINANCIAL GROUP JAPAN	412
MØLLER (A.P.)-MÆRSK DENMARK	208
MONDELEZ INTERNATIONAL U.S.	348
MORGAN (J.P.) CHASE & CO. U.S.	61
MORGAN STANLEY U.S.	306
MORRISON (WM.) SUPERMARKETS BRITAIN	431
MS&AD INSURANCE JAPAN	256
MUNICH RE GERMANY	103
NATIONAL AUSTRALIA BANK AUSTRALIA	266
NATIONAL GRID BRITAIN	486
NATIONWIDE U.S.	320
NEC JAPAN	444
NESTLÉ SWITZERLAND	70
NEW YORK LIFE INSURANCE U.S.	297
NIKE U.S.	425
NIPPON LIFE INSURANCE JAPAN	138
NIPPON STEEL & SUMITOMO METAL JAPAN	204
NIPPON TEL. & TEL. JAPAN	65
NISSAN MOTOR JAPAN	59
NOBLE GROUP CHINA	77
NORTHROP GRUMMAN U.S.	494
NORTHWESTERN MUTUAL U.S.	433
NOVARTIS SWITZERLAND	167
OCCIDENTAL PETROLEUM U.S.	459
OIL & NATURAL GAS INDIA	449
OLD MUTUAL BRITAIN	466
OMV GROUP AUSTRIA	223
ONEX CANADA	490
ORACLE U.S.	300

ORANGE FRANCE	199
PACIFIC CONSTRUCTION GROUP CHINA	156
PANASONIC JAPAN	131
PDVSA VENEZUELA	39
PEGATRON TAIWAN	355
PEMEX MEXICO	47
PEOPLE'S INSURANCE CO. OF CHINA CHINA	174
PEPSICO U.S.	141
PERTAMINA INDONESIA	130
PERUSAHAAN LISTRIK NEGARA INDONESIA	480
PETROBRAS BRAZIL	28
PETRONAS MALAYSIA	68
PEUGEOT FRANCE	128
PFIZER U.S.	211
PHILIP MORRIS INTERNATIONAL U.S.	398
PHILLIPS 66 U.S.	23
PHOENIX PHARMAHANDEL GERMANY	405
PING AN INSURANCE CHINA	96
PKN ORLEN GROUP POLAND	353
PLAINS GP HOLDINGS U.S.	249
POSCO SOUTH KOREA	162
POSTE ITALIANE ITALY	310
POWER CHINA CHINA	253
POWER CORP. OF CANADA CANADA	298
PROCTER & GAMBLE U.S.	100
PRUDENTIAL BRITAIN	74
PRUDENTIAL FINANCIAL U.S.	194
PTT THAILAND	93
PUBLIX SUPER MARKETS U.S.	388
QUALCOMM U.S.	448
QUANTA COMPUTER TAIWAN	389
RABOBANK NETHERLANDS	394
RELIANCE INDUSTRIES INDIA	158
RENAULT FRANCE	191
REPSOL SPAIN	188
RIO TINTO GROUP BRITAIN	222
RITE AID U.S.	447
ROCHE GROUP SWITZERLAND	189
ROLLS-ROYCE HOLDINGS BRITAIN	498
ROSNEFT OIL RUSSIA	51
ROYAL AHOLD NETHERLANDS	248
ROYAL BANK OF CANADA CANADA	299
ROYAL BANK OF SCOTLAND GROUP BRITAIN	303
ROYAL DUTCH SHELL NETHERLANDS	3
ROYAL PHILIPS NETHERLANDS	385
RWE GERMANY	154
SABIC SAUDI ARABIA	209
SAIC MOTOR CHINA	60
SAINSBURY (J.) BRITAIN	301
SAINT-GOBAIN FRANCE	192
SAMSUNG C&T SOUTH KOREA	441
SAMSUNG ELECTRONICS SOUTH KOREA	13
SAMSUNG LIFE INSURANCE SOUTH KOREA	456
SANOFI FRANCE	241
SBERBANK RUSSIA	177
SCHLUMBERGER U.S.	215
SCHNEIDER ELECTRIC FRANCE	367
SEARS HOLDINGS U.S.	383
SEVEN & I HOLDINGS JAPAN	184
SHAANXI COAL & CHEMICAL INDUSTRY CHINA	416
SHAANXI YANCHANG PETROLEUM CHINA	380
SHANDONG ENERGY GROUP CHINA	373
SHANDONG WEIQIAO PIONEERING CHINA	234
SHANGHAI PUDONG DEVEL. BANK CHINA	296
SHANXI COKING COAL GROUP CHINA	264
SHANXI JINCHENG ANTHRACITE COAL CHINA	379
SHANXI LUAN MINING GROUP CHINA	358
SHARP JAPAN	470
SHENHUA GROUP CHINA	196
SHOUGANG GROUP CHINA	402
SIEMENS GERMANY	63
SINOCHEM CHINA	105
SINOMACH CHINA	288
SINOPEC GROUP CHINA	2
SINOPHARM CHINA	276
SK HOLDINGS SOUTH KOREA	57
SNCF FRANCE	322
SOCIÉTÉ GÉNÉRALE FRANCE	49
SODEXO FRANCE	485
SOFTBANK GROUP JAPAN	110
S-OIL SOUTH KOREA	439
SOMPO JAPAN NIPPONKOA JAPAN	396
SONY JAPAN	116
SSE BRITAIN	205

STANDARD CHARTERED BRITAIN	479
STANDARD LIFE BRITAIN	335
STATE BANK OF INDIA INDIA	260
STATE FARM INSURANCE COS. U.S.	127
STATE GRID CHINA	7
STATOIL NORWAY	75
SUMITOMO JAPAN	350
SUMITOMO ELECTRIC INDUSTRIES JAPAN	461
SUMITOMO LIFE INSURANCE JAPAN	372
SUMITOMO MITSUI FINANCIAL GROUP JAPAN	243
SUNCOR ENERGY CANADA	317
SUZUKI MOTOR JAPAN	436
SWISS RE SWITZERLAND	313
SYSCO U.S.	229
TAIWAN SEMICONDUCTOR TAIWAN	472
TALANX GERMANY	292
TARGET U.S.	117
TATA MOTORS INDIA	254
TECH DATA U.S.	427
TELECOM ITALIA ITALY	359
TELEFÓNICA SPAIN	140
TELSTRA AUSTRALIA	481
TESCO BRITAIN	62
TESORO U.S.	279
TEWOO GROUP CHINA	146
3M U.S.	377
THYSSENKRUPP GERMANY	179
TIAA-CREF U.S.	349
TIME WARNER U.S.	415
TJX U.S.	410
TOKIO MARINE HOLDINGS JAPAN	290
TOKYO ELECTRIC POWER JAPAN	161
TONENGENERAL SEKIYU JAPAN	428
TORONTO-DOMINION BANK CANADA	357
TOSHIBA JAPAN	157
TOTAL FRANCE	11
TOYOTA MOTOR JAPAN	9
TRAFIGURA BEHEER NETHERLANDS	40
TRAVELERS COS. U.S.	438
TUI GERMANY	469
TWENTY-FIRST CENTURY FOX U.S.	375
TYSON FOODS U.S.	311
UBS GROUP SWITZERLAND	308
ULTRAPAR HOLDINGS BRAZIL	414
UNICREDIT GROUP ITALY	246
UNILEVER BRITAIN/NETHERLANDS	153
UNION PACIFIC U.S.	493
UNIPOL ITALY	406
UNITED CONTINENTAL HOLDINGS U.S.	294
UNITEDHEALTH GROUP U.S.	35
UNITED PARCEL SERVICE U.S.	168
UNITED SERVICES AUTO. ASSN. U.S.	492
UNITED TECHNOLOGIES U.S.	149
U.S. POSTAL SERVICE U.S.	137
VALE BRAZIL	312
VALERO ENERGY U.S.	34
VATTENFALL SWEDEN	491
VEOLIA ENVIRONNEMENT FRANCE	376
VERIZON COMMUNICATIONS U.S.	41
VINCI FRANCE	200
VIVENDI FRANCE	413
VODAFONE GROUP BRITAIN	136
VOLKSWAGEN GERMANY	8
VOLVO SWEDEN	268
VTB BANK RUSSIA	404
WALGREENS BOOTS ALLIANCE U.S.	114
WAL-MART STORES U.S.	1
WELLS FARGO U.S.	90
WESFARMERS AUSTRALIA	171
WESTON (GEORGE) CANADA	287
WESTPAC BANKING AUSTRALIA	330
WILMAR INTERNATIONAL SINGAPORE	252
WOOLWORTHS AUSTRALIA	181
WORLD FUEL SERVICES U.S.	250
WUHAN IRON & STEEL CHINA	500
XINXING CATHAY INTERNATIONAL CHINA	344
YANGQUAN COAL INDUSTRY GROUP CHINA	409
ZF FRIEDRICHSHAFEN GERMANY	488
ZHEJIANG GEELY HOLDING GROUP CHINA	477
ZHEJIANG MATERIALS INDUS. GROUP CHINA	339
ZURICH INSURANCE GROUP SWITZERLAND	122

NO. 13
SAMSUNG ELECTRONICS

THE UNCROWNED KING OF TECH

REVENUES	$195.8 BILLION
PROFITS	$21.9 BILLION
EMPLOYEES	307,000
FIVE-YEAR ANNUALIZED RETURN TO SHAREHOLDERS	11.8%

BY ADAM LASHINSKY

PHOTO ILLUSTRATION BY ANTHONY VERDUCCI

JAY Y. LEE, Samsung's debonair, globe-trotting heir apparent, is determined to transform the world's biggest technology company into its most innovative. Can he dethrone Apple?

EVEN FOR THE DE FACTO HEAD of one of the world's largest family-controlled business empires, Jay Y. Lee, vice chairman of Samsung Electronics, has had a lot on his plate lately. On the same Thursday morning in early June that he breakfasted in Seoul with J.P. Morgan CEO Jamie Dimon, for instance, Lee learned that the $26 billion New York hedge fund Elliott Management had launched a surprise attack against him. Elliott wanted to stop Lee from merging two publicly traded pieces of his family's network of companies, potentially foiling Lee's plan to consolidate control.

A few weeks later, on the day he turned 47, Lee gave his first-ever nationally televised speech in South Korea to offer an apology—including a symbolic bow—because the Samsung Medical Center in Seoul had failed to contain an outbreak of the deadly Middle East respiratory syndrome virus known as MERS. Not long after, the scion of the family that runs Korea's mightiest conglomerate led a team of executives on a fact-finding mission to Silicon Valley. An avid golfer, Lee found time to pop down to Pebble Beach for a members-and-guests-only tournament at the exclusive Cypress Point Golf Course with his pal and host Jerry Yang, the Yahoo co-founder. Days later, after returning to Korea, he jetted back to the U.S. to hobnob with other global tech leaders at the annual Allen & Co. gathering in Sun Valley, Idaho. In mid-July, Lee found out that he had prevailed in his heated six-week battle with Elliott, and that shareholders had voted to approve the merger.

A veritable prince of the realm in Korea and supremely well connected among the global elite, Lee, who has a net worth of around $8 billion, nevertheless is not widely known outside his native land. At home, Lee's life as a single dad and the next-generation leader of Samsung makes him a boldface name. Even in Korea, however, it isn't well understood exactly what he does. That's partly because he has long been overshadowed by his larger-than-life father, Lee Kun-hee, chairman of the Samsung Group.

The younger Lee's profile is about to grow dramatically. In recent months he has made himself more visible, implicitly acknowledging that he is now the leader of the Lee clan and its business interests. The elder Lee, age 73 and Samsung's chief for nearly 30 years, suffered a heart attack 14 months ago. He has been hospitalized ever since—at the same Samsung-owned facility where the MERS crisis began—and his condition is believed to be so grave that he cannot communicate and isn't expected to recover. In other words, the man who built Samsung into a global powerhouse in everything from semiconductors to TVs to mobile phones has all but left the scene. And he has been succeeded—in actions, if not yet in title—by his relatively untested only son.

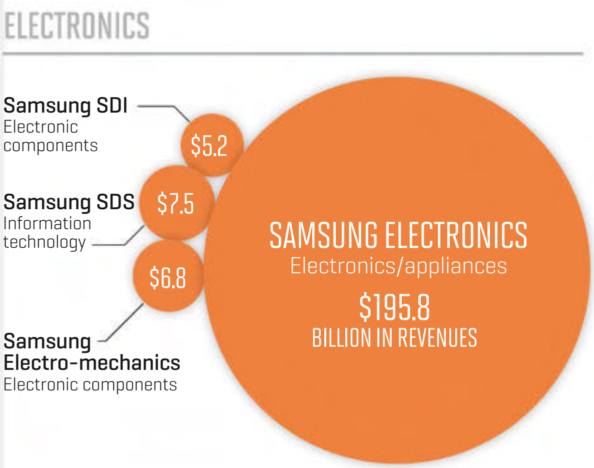
So just who is Lee Jae-yong, known to his Western friends as Jay Y. Lee? Simply speaking, he is everything Samsung wants to be—but isn't yet. One of three vice chairmen of Samsung Electronics, the conglomerate's largest company, Lee runs no single business yet holds great sway over all of them. (He has two younger sisters who run businesses within the group; a third sister committed suicide in 2005.) He is the most international Samsung executive—he speaks fluent Japanese and English, and travels widely—yet is thoroughly a product of his Korean heritage. Just as Lee glides between Asian and Western worlds, his goal is to move Samsung beyond its Korean roots without losing the attributes that led to its success.

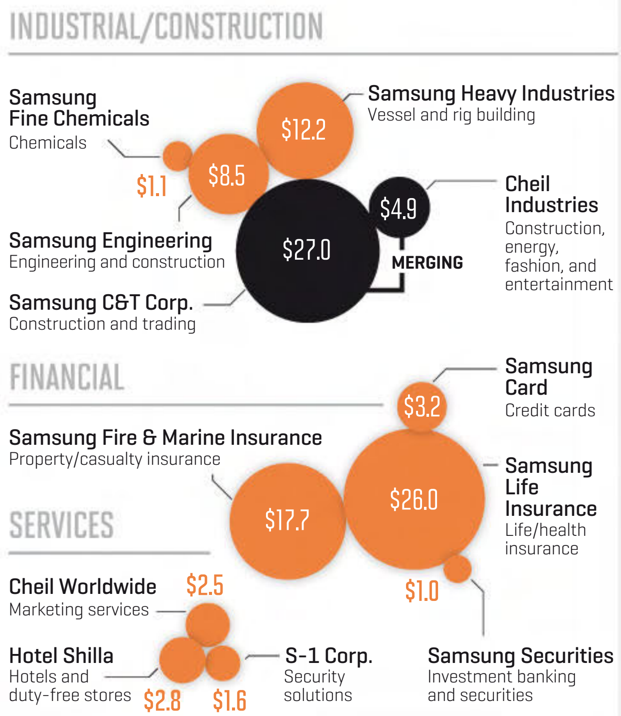
The generational transition comes at a critical time for Samsung. Its cash-gushing smartphone business is tops in the world by market share but has recently found itself squeezed by the vastly more profitable Apple on the high end and a bevy of price-slashing Chinese competitors below. As well, membership in the privileged club of Korean conglomerates, known (in both singular and plural) as

PREVIOUS SPREAD: PHOTO ILLUSTRATION BASED ON PHOTO BY LEE YOUNG HO/SIPA—AP

A WIDE-RANGING BUSINESS EMPIRE

SINCE ITS founding in 1938, the South Korean family-controlled conglomerate, or *chaebol*, known as Samsung Group has grown into a network of dozens of companies. The Lee family's power resides in a complex web of equity holdings in various companies. A merger between Lee family holding company Cheil Industries and Samsung C&T will help consolidate Jay Y. Lee's power. Here, a sampling of the *chaebol*'s largest publicly traded entities:





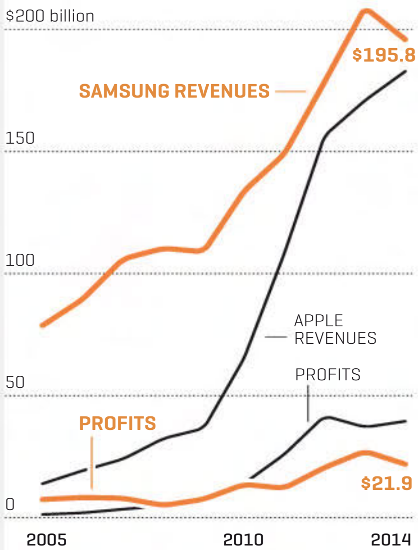
chaebol, isn't quite what it used to be, what with a new era of shareholder activism and public revulsion at the behavior of elites.

Lee doesn't grant on-the-record interviews to the media, and he and Samsung's top executives are exceedingly sensitive about upstaging the ailing patriarch, in keeping with the Confucian tradition of respect for elders. At the same time, Samsung is a notably image-conscious company, and it is well aware of the intensifying scrutiny of its all-but-anointed leader. With that in mind, Samsung recently gave *Fortune* unusually deep access to various corners of its domain. The company also made available the CEOs of two key companies in the Samsung Group. Both executives spoke openly about Jay Y. Lee's leadership and the challenges he faces.

Among Lee's priorities, these executives and others say, are to simplify a dizzyingly complex corporate structure, to prod Samsung's leadership to be creative as well as relentless, and to globalize what has stubbornly remained an essentially Korean company that just happens to sell products around the world. Lee and his coterie of powerful executives know there will be plenty of resistance to these changes. After all, Samsung has successfully employed its traditional "me-too" approach for decades—jumping into new lines of business and out-executing the competition until it becomes the market leader. In the process Samsung has grown into one of the world's biggest and richest corporate kingdoms. With $195.8 billion in revenue last year, Samsung Electronics ranks No. 13 on this year's Global 500—the largest tech company on the list and two spots ahead of Apple. Construction and trading business Samsung C&T (No. 441) and Samsung Life Insurance (No. 456) are also ranked in the Global 500. Together, the Samsung Group

GRAPHIC SOURCES: *FORTUNE* RESEARCH; FACTSET RESEARCH SYSTEMS

A TALE OF TWO TECH GIANTS: SAMSUNG VS. APPLE



Chairman Lee Kun-hee built Samsung into South Korea's most important *chaebol* but is believed to be gravely ill. Daughters Lee Boo-jin (right) and Lee Seo-hyun each run parts of the family business empire.

has more than $320 billion in sales from dozens of separate companies.

But the fear inside Samsung's executive suite is that its success, especially in the realm of technology, could be fleeting. Leadership in tech markets tends not to last, as Samsung's recent dip in smartphones shows. A sense of healthy paranoia pervades Samsung that an insular mentality and a reliance on commodity products won't serve it as well in the future as they have in the past. Samsung executives frequently reference the downfall of once-powerful Japanese electronics rivals such as Sony and Sharp.

To avoid such a fate, Samsung today is hyperfocused on innovation—with an emphasis on game-changing advances. The company has long pushed the envelope in everything from semiconductors to smartphones to televisions. For example, its smartphone chips are considered superior to Intel's. What it has not achieved is the creation of new industries, à la Apple. To increase the chances of a major breakthrough, Samsung Electronics spent nearly $14 billion on research and development last year—or easily more than twice the $6 billion that Apple devoted to R&D in 2014.

Money alone won't achieve what Lee wants, however. To keep Samsung growing and to challenge Apple in the eyes of customers, Lee and his key advisers believe, the company must be willing to embrace both new ideas and new leaders from outside Korea. "The biggest challenge that we have is that there are a lot of people still, the old-timers of Samsung, who don't really understand what 'global' means," says Choi Chi-hun, CEO of Samsung C&T. "Jay is a very global person. He understands this." Understanding is one thing, of course. Changing an organization with nearly half-a-million employees is another thing altogether.

The Power and the Glory

AT THE BEGINNING of 2015 a group of senior executives in Samsung Electronics' TV manufacturing division, which is No. 1 in market share with more than 20% of global sales, held a meeting attended by Jay Y. Lee. The vice chairman, as he is typically referred to by Samsung's more formal officials, made some mildly critical comments about the division's marketing efforts, according to a version

STEVE MARCUS—REUTERS

of the meeting that has made the rounds of Samsung's top managers. Thirty-year veteran Park Gwang-gi, an executive vice president and the unit's head of strategic marketing, was said to be so rattled by Lee's criticism that he immediately resigned his position.

The anecdote is notable because it helps illustrate the power that Samsung's founding family wields despite the complicated chain of ownership and command inside the conglomerate. For starters, operating authority resides in individual business units, not headquarters. What's more, the Lee family holds a relatively small stake in Samsung Electronics and even smaller positions in other Samsung affiliates. Further confusing things, it can be a challenge to define just what Samsung is—or isn't. Consider a disclaimer Samsung posts on a corporate website: "Each company within the Samsung Group is an independent legal entity. Samsung Group is not a legal entity. Samsung Group is a term to conveniently refer to a group of companies that are tied together by their corporate history."

That corporate history dates back some eight decades, to when Jay Y. Lee's grandfather, Lee Byung-chul, started a food trading business in 1938. Today the *chaebol* comprises 67 distinct businesses whose product lines range from apparel and amusement parks to shipbuilding, washing machines, and financial services. Because of its market-leading positions in three massive industries—smartphones, memory chips, and TVs—Samsung Electronics is by far the most important part of the conglomerate, accounting for two-thirds of group revenues and an even greater portion of its profits.

Samsung owes its rise from middling *chaebol* to global powerhouse to the achievements of the current chairman Lee. He urged his executives to invest aggressively in order to gain scale and market share—regardless of short-term profits. "Our chairman consistently made the decision to invest regardless of the business environment," says Kwon Oh-hyun, a Samsung Electronics vice chairman and head of its semiconductor business. Kwon, who earned a Ph.D. in electrical engineering from Stanford before joining Samsung in 1985, says there was a widespread belief back then that the elder Lee "was crazy and would bankrupt the company" with his investment in memory chips. "But he succeeded and became legendary."

The company followed the same invest-for-scale model in each of its major businesses, displacing Sony in TVs and Nokia in mobile phones. Along the way it developed a reputation for brute-force tactics against competitors and a win-at-all-costs ethos among its overworked employees. Today Samsung Electronics is a behemoth with 307,000 workers. It's so big, in fact, that it builds whole mini-metropolises to accommodate the growth. Its Samsung Digital City in Suwon, outside Seoul, has the look and feel of a Silicon Valley corporate campus, with 500 different bus routes ferrying its 34,000 employees to and from Seoul and other parts of South Korea.

This hyperplanned environment is in keeping with Samsung's penchant for controlling every step of its production. Building its own factories gives the company a speed advantage, says Choi, the Samsung C&T executive. Samsung originally intended to release its Galaxy S6 line of smartphones in the fall of this year, says Choi, but decided to move up production by six months. "We were building that plant for them," he says of his construction business in an interview at Samsung's main headquarters in

the posh Gangnam district in central Seoul. "Working together we were able to come up with a way of getting those phones to be produced that I don't think anyone else could have done."

The best and worst of the Samsung fast-follower model can be seen in both the soaring success and relative decline of late in its biggest business: smartphones. Samsung Electronics plunged full force into the market after the debut of the iPhone in 2007. And after a decision in 2009 to use Google's low-cost Android operating system across its product line—as a way of quickly and cheaply countering Apple's proprietary operating system, iOS—Samsung raced to the top of the heap in 2011 with its Galaxy S II phone. Its profits then skyrocketed, especially when its large-size screens proved popular and Apple was slow to respond. Then last year Apple rolled out its larger-screen iPhone 6 devices, and Samsung's growth hit a wall. Samsung Electronics recently previewed second-quarter financial results, suggesting that profits will be $6.1 billion, down 4% from the year-earlier period and the seventh consecutive quarterly profit decline. All things—including screen size—being equal, consumers appear willing to pay a premium for the innovation coming out of Apple.

The view inside Samsung is that the margins and growth in smartphones during 2012 and 2013 were abnormal, and that even the current depressed level of profitability is an achievement. Shaun Cochran, Korea country head of brokerage CLSA, finds merit in the argument. "There are two companies in the world that have a profitable position in smartphones, and they're one of them," he says. "The margins are no longer supermargins. But really, supermargins are temporary by nature. Only Apple gets them now."

People familiar with Jay Y. Lee's thinking about the slowdown describe him as disappointed but not ready to back down. He acknowledges that Samsung isn't No. 1 in smartphones yet. "It is Apple by revenue, profit, and mindshare of customers," one of them related Lee as having said. "That said, we've been benchmarking Sony, Philips, and Nokia for years. Now we have fewer companies to benchmark."

A man in Seoul walks by an ad for the Galaxy S6. Samsung hopes the new smartphone, which went on sale in April, will win back straying customers.

KIM HONG-JI—REUTERS

The Uncrowned King

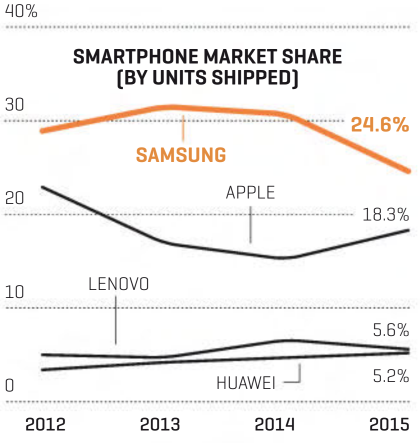
YANG YUANQING, THE CEO of Lenovo, first met Jay Y. Lee at the Summer Olympics in Beijing in 2008. Samsung and Lenovo both were sponsors of the games, and, says Yang, "Our private booths were next to each other." Despite being a competitor across multiple product lines, Lenovo is one of Samsung's biggest customers, annually buying more than $2 billion worth of various kinds of semiconductors and LCDs for its computers. The two struck up a friendship. Yang praises Lee for his attention to detail and was particularly touched by a gift the Samsung leader brought on a visit to Beijing: "He found out my birth year and gave me a bottle of wine that was produced that year."

The gesture is vintage Lee, who is known for his impeccable manners and cosmopolitan demeanor. Indeed, Lee in many ways was raised for the role of global ambassador for Samsung. He studied history at Seoul National University, Korea's top school. Like his father and grandfather before him, he studied in Japan, earning an MBA from Keio University. He later completed doctoral coursework at Harvard Business School, though he left without a degree. After presiding over a failed business unit called e-Samsung during the Internet bubble of the early 2000s, Lee took on the role he'd been born for: learning beside his father for the day he'd take his place.

Part of that role has been representing Samsung with its most important customers—some of whom, like Lenovo, are equally bitter competitors. Lee, for example, is said to have personally negoti-

FEELING THE SQUEEZE

Samsung remains No. 1 in smartphones but has been losing market share to both Apple's iPhone 6 and lower-cost Chinese models.



ated with Steve Jobs over Apple's critical purchase of flash memory for the iPod Nano. The deal was a watershed because it required a significant commitment of manufacturing capacity by Samsung for an Apple product that wasn't yet proven in the marketplace.

To this day Lee is a linchpin of the complicated Apple-Samsung relationship, and he keeps in touch with CEO Tim Cook as well as Jeff Williams, Cook's successor as head of Apple's global procurement and supply-chain management. "I've heard them talk about Jay fondly," says a U.S.-based executive who has interacted with both sides. Says Lee Keon-hyok, a former IMF economist who is Lee's chief spokesman: "I compare it to Romeo and Juliet. The families go on feuding, but they agree to the marriage." (Fond of Lee or not, neither Cook nor Williams agreed to be interviewed about him; in 2012, Apple, which still buys Samsung chips and displays, won a $1 billion patent-infringement judgment against Samsung in a U.S. court over disputed smartphone designs.)

Samsung's might and Lee's charm have cemented other important tie-ups for Samsung. John Elkann, the Agnelli family scion who is Lee's equivalent in the Fiat empire, invited Lee to join the board of Exor, the publicly traded company that manages the Agnelli family's stakes. He praises Lee for having advised Exor on its ongoing efforts to simplify its corporate structure and enter the insurance business.

A common refrain about Lee is how relatively normal he is. "He's surprisingly casual and accessible and a nice guy and non-hierarchical, given who he is," says a former Samsung executive who interacted with Lee occasionally. "He travels by himself, with no entourage. He dresses casually. He says, 'Hi, I'm Jay, nice to meet you.' " Lee has instructed the guards at Samsung's headquarters not to bow 90 degrees to him. He displays his own ID when he walks around the building. And he delights in taking visiting dignitaries to see the on-site day-care center his father built to help retain women at Samsung.

Lee may also be the most eligible bachelor in Korea. A father of a school-age son and daughter, he was divorced from their mother in 2009. He lives in what visitors describe as a relatively modest home built on land his family has owned for decades in an upscale Seoul neighborhood. His dining room is steps from the exquisite Leeum art museum—the name is a mashup of "Lee" and "museum"—which holds a priceless collection, begun by his grandfather, of ancient Korean and contemporary international art. Lee is said to be particularly proud of the solar panels he had installed on the roof of his home.

The son apparently intends to be a more visible chairman of Samsung than his father, who visited the head office infrequently, preferring to work from home and maintain an air of mystery. To the extent that the younger Lee already has made his mark, it is with an ongoing effort to streamline Samsung. In recent years Samsung has sold off businesses with interests in disk drives, defense, and petrochemicals.

Outside executives see savvy analysis behind that strategy. Steve Luczo, CEO of disk-drive maker Seagate, praises Lee for the insight and decisiveness that led Seagate to buy out Samsung's drive business in 2011. The moment competitors Western Digital and Hitachi agreed to combine their businesses, says Luczo, Lee recognized that Samsung's operation would be better off in the hands of Seagate, which had significantly larger market scale. "He started asking all the right questions," says Luczo. "And they were detailed operating questions."

Doubts linger about Lee closer to home, however, partly because of his privileged background. "Chairman Lee gathered a couple thousand people and said, 'I'll give you any resource. I want 50% share of mobile handsets,' " recounts a Korean executive who

GRAPHIC SOURCE: IDC; MOTOROLA FIGURES HAVE BEEN FOLDED INTO LENOVO'S.

knows the Lee family well. "I'm not sure Jay has that. He was raised to be a king, not an entrepreneur."

But according to those who know him, Lee doesn't intend to become a headliner on behalf of Samsung's companies, even when he assumes the chairman's role. His father allowed operating executives to be the faces of their businesses, and so will he. Still, Lee has told people he understands the downside of being an enigma. He has said he understands the need to demystify the role of the founding family.

All in the Family

FAR FROM SAMSUNG'S headquarters, on the other side of Seoul, lies a newly developed section of town called Digital Media City that has become a hub for young television and gaming companies. (Not to be confused with Samsung Digital City; Korea is extremely "digital.") On the set of a studio there on a sunny June afternoon, the boy band EXO is rehearsing a performance of its hit single "Love Me Right." Two hundred adolescent girls wait impatiently to enter the studio to see their teenage idols. The band's host is the entertainment division of film production and consumer-goods conglomerate CJ Group, sponsor of a popular TV show that will feature EXO later that day.

CJ has little in common with Samsung, which is as buttoned-up a company as they come, but for one fact: The entertainment group is run by a cousin of Jay Y. Lee's named Miky Lee. She is known for having made an early and lucrative investment in DreamWorks Animation. The "C" in CJ stands for Cheil, the original name of the Lee family holding company that exists to this day as Cheil Industries.

As the No. 1 operator of Korean movie theaters and also the franchisee for multiple retail outlets, foreign and domestic, CJ is just one example of the vast reach of the family behind Samsung. One of Jay Y. Lee's sisters, Lee Boo-jin, runs Hotel Shilla, a high-end hotel

Curved, ultra-high-definition Samsung TVs on display in New York City in April 2015. Samsung is the No. 1 manufacturer of TVs globally, ahead of Korean rival LG.

DIANE BONDAREFF—AP

company that has expanded into the duty-free business. His other sister, Lee Seo-hyun, heads up the fashion business of Cheil Industries. Cheil Worldwide is the largest advertising agency in Korea. Relatives of Lee's run the Shinsegae department store and the leading daily newspaper, *JoongAng Ilbo,* which was started by the patriarch in the 1960s and is considered friendly to Samsung, though it's not owned by it.

In short, the Lee family touches almost every aspect of Korean life. Young people simultaneously blame Samsung (and other *chaebol* like Hyundai and LG) for sucking the air out of what otherwise could be an entrepreneurial climate and want to work for it. The 18 listed companies in the Samsung network are widely perceived to trade at a discount to their true market value based on the perception that the family runs the companies for its own goals rather than for shareholders.

This is precisely what attracted the attention of Elliott Management, which amassed a 7% stake in Samsung C&T, when it unveiled plans to be bought by Cheil Industries, which is 23% owned by Jay Y. Lee. Elliott argued that Samsung C&T was undervalued and that Cheil was unfairly acquiring it for its 4% stake in Samsung Electronics. The Lee family previously held a less than 5% stake in the electronics company, and the merger, Elliott contended, would give Jay Y. Lee and his two sisters a windfall gain they will need to pay the inheritance tax they will owe when their father dies.

If the assault by Elliott caught Samsung by surprise, it was prepared for the fight nevertheless. Samsung carried the day in Korean courts against two injunctions brought by Elliott. And shareholders in Samsung C&T, led by a large block of Korean pension funds, approved the merger in a much-watched shareholder vote on July 17. It was the first time the Samsung empire had encountered such an attack by foreign investors, but likely will not be the last.

The Future of Samsung

IN THE WESTERN CITY OF INCHON, the port town on the Yellow Sea where Douglas MacArthur landed and turned the tide of the Korean War, lies a glimpse into Samsung's future. Here, in just four years, the conglomerate has built a vast new business called Samsung Bio-

logics, which manufactures biopharmaceuticals for global drug companies, including Roche Genentech and Bristol-Myers Squibb. The business is said to be a favorite project of Lee's, and it has all the hallmarks of a Samsung endeavor: massive scale, billions in investments, and the application of manufacturing expertise to a promising new business.

On the surface, at least, it appears to be another example of fast-following. Samsung Biologics makes tough-to-produce drugs for the owners of the formula the same way Foxconn builds phones and computers for name-brand designers like Apple and Dell. Biopharmaceuticals are proteins, which means they're more difficult to sterilize than traditional drugs, which are made from stable chemicals. In the Inchon facility, Samsung has built 30,000 liters of production capacity in a sprawling plant filled with large metal vats. It already is at work on its second plant, a so-called 10-pack, or 10 15,000-liter tanks. "No one else in the industry has a 10-pack," says Jenifer Wheat, vice president of global business development and one of more than 60 expatriate veterans of Western pharmaceutical companies Samsung has hired to jump-start the biologics business.

The Samsung Biologics investment will take years to pay off, but already Samsung is finding ways to cash in on it. A 90%-owned unit called Samsung Bioepis makes "biosimilar" drugs—the generics of biotech—and recently said it plans to go public on the Nasdaq market in the U.S. Published reports have valued the generics unit at $7 billion. And the health care initiatives, Samsung says, are but part of a broader strategy of finding ways to marry medical markets with information technology. "There are a lot of maybe-not-so-obvious synergies between the two businesses," says Wheat. The implication is that one of these synergies could even produce a new business built on real innovation someday.

Samsung has a pronounced preference for building its businesses rather than buying them. In part, this is because the South Korean government rewarded it and other *chaebol* for years for reinvesting their profits in R&D, the better to build the domestic economy. The company also carries the scars of a two-decades-old M&A fiasco, the mid-1990s acquisition of a Southern California computer maker called AST Research. Samsung spent nearly $1 billion on the purchase and then proceeded to lose billions more. The failure haunts Samsung strategists and is a frequently repeated discussion point for why Samsung avoids M&A.

The company has become more acquisitive of late, but in small ways relative to its size. A U.S.-based venture arm recently bought a software company called SmartThings that addresses the so-called Internet of things market. And earlier this year Samsung's mobile division paid $250 million to buy LoopPay, a mobile-payments startup the company hopes will be its answer to competing offerings from Apple, Google, and others.

One place where Samsung comes up far short in comparison with Apple is in the development of its own mobile ecosystem. As its Galaxy line of smartphones took off, the company decided it needed to have mobile services to match Apple's and Google's. So it formed a Seoul-based outfit called the Media Solutions Center, funded by its mobile division but operating independently. The media-services group annoyed partners like Google and, worse, produced few hits.

Late last year Samsung quietly dissolved the unit, which had amassed a worldwide staff of 2,000, and reassigned its personnel. Curiously, Samsung left intact the Silicon Valley arm of the media-services unit and hired former Disney executive John Pleasants to run it. Insiders say the hunt for a mobile-services strategy continues. Says venture capitalist Jay Y. Eum, a California-based former Samsung employee: "Samsung is the hardest-working technology company in the world. They will not stop until they've figured it out."

A Yearning, Searching Company

AT THE BEGINNING OF THE 1990s, Jay Y. Lee's father realized that Samsung's culture was too inward-looking. So he created a program to each year send 100 of Samsung's most promising middle managers out to visit countries around the world on yearlong sabbaticals to soak up the local culture and return to Korea with new perspectives. It's a tradition that continues. Today, at its headquarters in Seoul, it also employs several hundred non-Koreans with MBAs to work on global strategy, on the assumption that foreigners bring fresh thinking. Samsung has long been a yearning, searching company. And under the next chairman Lee it will attempt to complete the transformation from studying the rest of the world's best practices to internalizing them.

Come December, when Samsung typically announces annual organizational changes, it is quite possible that Jay Y. Lee will be named chairman, whatever his father's health status. In one fell swoop Samsung officially will have a leader whose experience screams out fresh perspectives. Putting them into action will be Jay Y. Lee's challenge for the decades ahead.

FEEDBACK *adam_lashinsky@fortune.com*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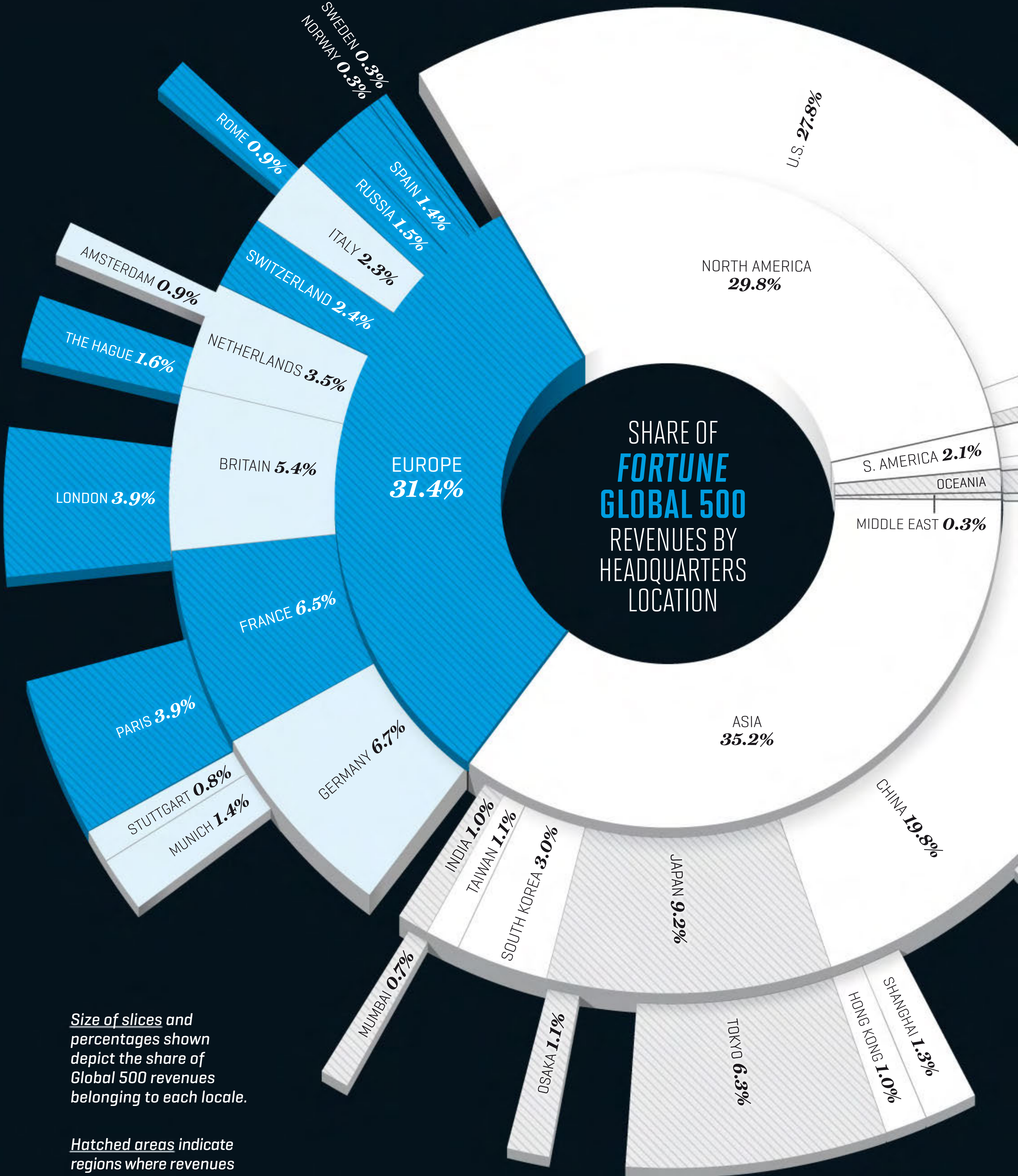


Size of slices and percentages shown depict the share of Global 500 revenues belonging to each locale.

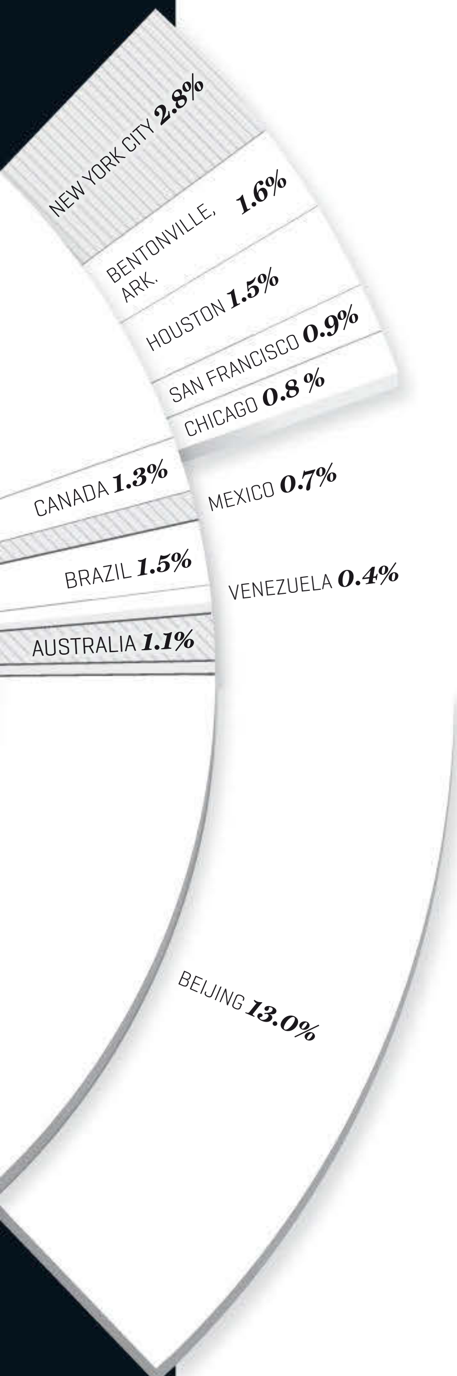
Hatched areas indicate regions where revenues decreased last year.

GLOBAL 500
CHARTIST

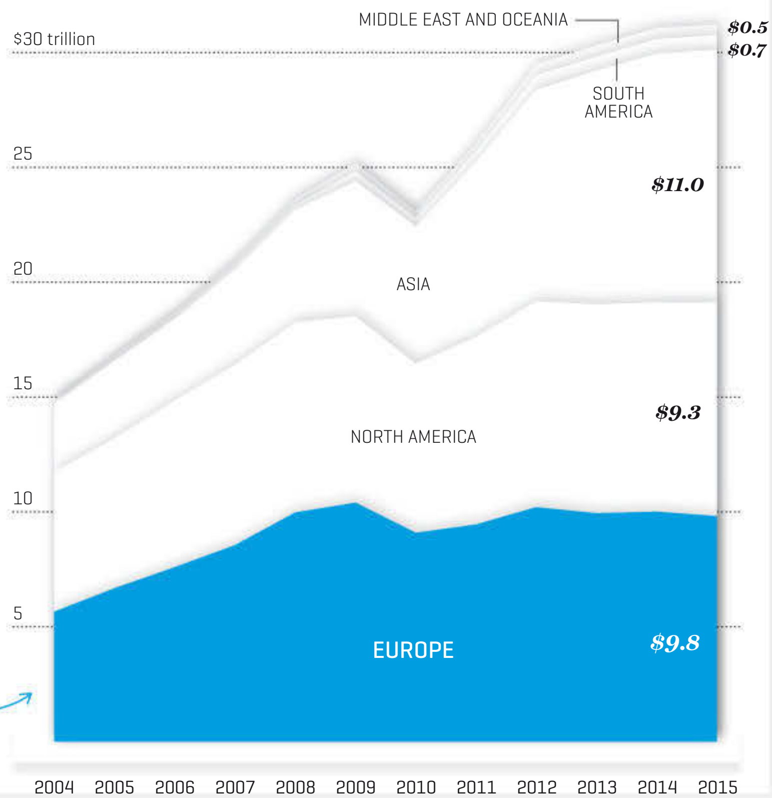
EAST BEATS WEST

GRAPHIC BY
NICOLAS RAPP
RESEARCH BY
SCOTT DECARLO

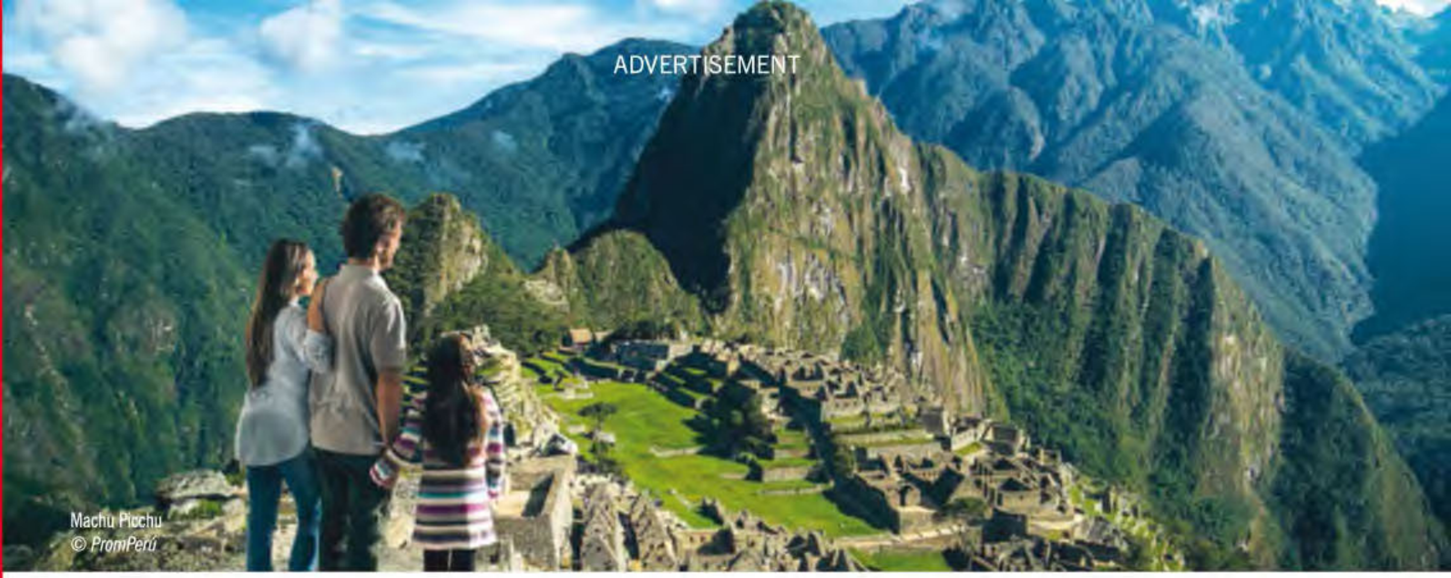
The world's biggest companies by revenue are both widely dispersed (they're based in 224 cities and 36 countries) and highly concentrated: A third have headquarters in Beijing, Tokyo, London, Paris, or New York. No surprise, the Asian (mostly Chinese) component of the list has registered smoking growth and bumped Europe from the top spot in 2013. Once dominant, North America has fallen to third place.



GROWTH BY REGION
COMPANY REVENUES (IN TRILLIONS)



Two recessions have taken their toll: Revenues for European Global 500 companies are down 6% since their peak in 2009 (including a 1.9% drop in 2014).



Machu Picchu
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PERU

Tourism Takes Center Stage

Blessed with lush rainforest, snowy peaks and thousands of miles of sandy beaches, it's not surprising that Peru clearly appeals to tourists. Coupled with world-famous marvels like the mountain-top Inca citadel of Machu Picchu and other ancient and mysterious sights such as the Nasca lines – the country has something to offer every type of traveler on any type of budget.

In 2014, the number of foreign visitors to Peru increased to over 3.2 million, and has grown 203% since 2002. Moreover, as a generator of foreign exchange, tourism revenues have increased from US$837 million to US$3.990 billion in the same period, making the sector one of the main foreign exchange generators of the country's economy.

The opportunities for investment in the Peruvian tourist sector are wide and attractive. A report issued in 2013 by Tourism & Leisure, and Europraxis found that in seven cities (Lima, Cusco, Arequipa, Piura, Lambayeque, La Libertad and Loreto), there is a projected investment deficit in hotel infrastructure of US$903 million until 2017; a figure that grows to US$ 1.554 billion by 2022, and an additional US$2.364 billion by 2027, adding up to an investment gap of US$4.820 billion for the period 2013-2027.

The Peruvian government has taken decisive action to narrow this gap, and is boosting incentives to attract investment in infrastructure with a policy of institutional development and investment promotion. Following up on the success of the COP20 and WTTC in 2014, Lima will host the South American Hotel and Tourism Investment Conference, and the IMF and World Bank annual meetings later in 2015. These promotional activities are enhanced by government policies geared toward reducing red tape and shortening execution times for investments.

"This government's goal is to reach 4 million tourists by 2016. It's a big challenge, so we are developing aggressive strategies to achieve it," says Magali Silva, Peru's Minister for Foreign Trade and Tourism.

"A package of investments are being introduced, with the creation of the Single Window Initiative for Tourism, which will allow managers of tourism infrastructure projects to streamline their procedures. We hope to speed up administrative procedures and make Peru a more attractive destination for doing business," says Silva.

Moreover, a fund has been created to finance the development and improvement of key tourist areas; and PromPeru, the Peruvian export and tourism promotion agency, carries out international campaigns to promote the Peru brand abroad.

The government is also supporting Public-Private Partnerships (PPPs) to promote the participation of private investment in the sector. Recent examples are the Kuelap archeological zone, where a PPP was awarded for the construction of a cable car, with a total investment of US$33 million; and the operation of the new Chinchero airport in Cuzco, which was awarded to the Kuntur Wasi consortium for 40 years, representing an investment of US$658 million.

"We have also been developing a series of other measures like the Works for Tax initiative, and the early return of VAT," Silva explains. The Works for Tax Act allows a private company to finance and execute public projects in the tourism sector chosen by the national, regional or local government, and then recover the full amount invested through income tax.

An example of early return on VAT, which involves the return of VAT levied on imports and/or local purchases of new capital and intermediate goods, services and construction contracts carried out in the pre-production stage of certain projects, is the Hotel Westin Libertador. With an investment of US$115 million, the hotel, which is the tallest building in Lima, recovered approximately US$20 million in VAT.

The results are starting to show. "In the first quarter of this year, the country experienced a growth of inbound tourism of 8%," says Magali Silva. "Peru is a wonderful country with great tourist attractions, making it a destination with huge potential, where new investment projects are welcomed with open arms." ●


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GLOBAL 500: NEXT GENERATION
TENCENT

BY SCOTT CENDROWSKI

TENCENT GROWS ITS OWN ECONOMY

It's the world's biggest online-games company. It runs China's biggest social network. Now Tencent, the web giant with the goofy penguin logo, is turning into one of the world's biggest venture capitalists. Will that strategy give it an edge in China's tech wars?

REVENUES	$12.8 BILLION
PROFITS	$3.9 BILLION
EMPLOYEES	27,690
TOTAL RETURN TO SHAREHOLDERS (2005–15, ANNUAL RATE):	61.8%

ILLUSTRATION BY BEN FEARNLEY


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A JOKE WAS MAKING THE ROUNDS a few years ago in China: If a U.S. startup had a great idea, Google might buy it. If a Chinese startup had a great idea, Tencent might copy it. ¶ That last thought crept into Wu Hao's mind late last year when Tencent, China's social media and online games giant, came calling. Wu's food delivery startup, Line0, was raising money, and Tencent wanted a stake. "At first we were concerned they had ulterior motives," says Wu, an energetic 32-year-old who started his business in China's old capital, Nanjing. Wu was worried that his yellow-uniformed deliverymen, who jet across China's cities on electric scooters, would be absorbed and copied by a web giant with $13 billion in revenue. ¶ But Tencent's venture capital team pitched Wu hard. They met with him five times, grabbing dinner with him at restaurants on the Line0 system. They told Wu that Tencent understood the ecosystem of "online to offline" companies like Line0—companies whose apps enable consumers to buy real-world goods and services. They had already invested in similar companies like Dianping, the Chinese equivalent of Yelp. They also reassured him about the future, when Tencent might propel Line0 in front of a half-billion potential new customers—the users of Tencent's gargantuan social network, WeChat.

What Tencent didn't need to tell Wu was that it was investing in startups faster than almost anyone else in the world. If Wu said yes, Line0 would join four dozen companies Tencent backed in 2014. Tencent didn't generally buy companies outright, but it had shown it would bolster them with very big checks.

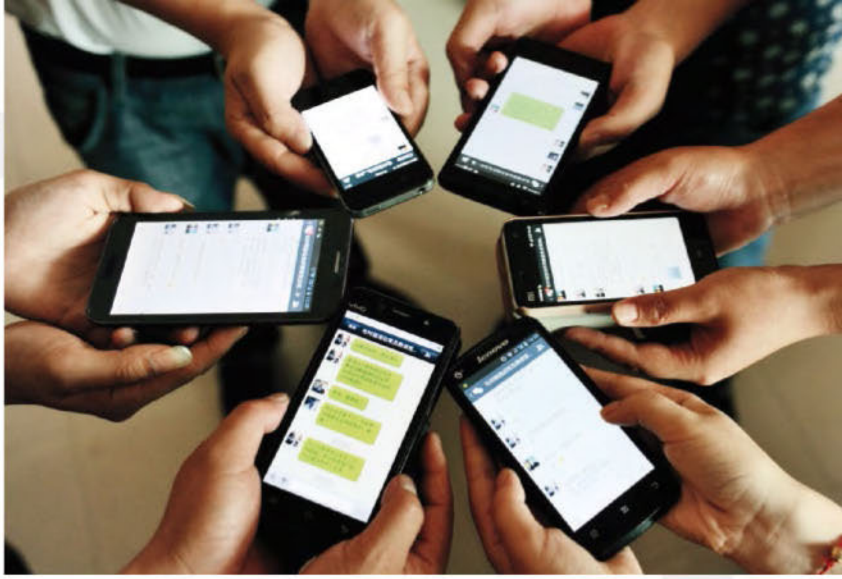
Wu didn't want to miss his shot. In January, Line0 received $30 million in a financing round led by Tencent. In return Tencent got the chance to add Line0's nearly 1 million users to its online payment network, —the central element of the company's battle plan in China's fast-evolving Internet wars.

CHINA'S BIGGEST TECH COMPANIES are in the middle of an uncertain transition. The country's three Internet giants—Baidu in search, Alibaba in e-commerce, and Tencent in social networking, known collectively as BAT—each became a profitable, multibillion-dollar empire on the strength of its core business. (Baidu had $8 billion in revenue in 2014, and Alibaba $12.3 billion—making both, like Tencent, big enough for the *Fortune* 500, though not the Global 500.) But as their growth has slowed, the Big Three have shifted into a new mode, spending billions on venture funding and acquisitions that could help them further expand their reach and their revenue. "Before it was, 'We can build it better ourselves,'" says Richard Robinson, a China-based entrepreneur and investor in startups, describing the BAT's attitudes. "But now that means you're behind."

In this land rush no company has been more aggressive than Tencent. Last year the company invested in four of China's 10 largest tech venture deals and took part in a total of 48 deals worth $6.3 billion, according to Preqin, an alternative-assets data company; by that measure, Tencent was a bigger venture capital player than Alibaba or Baidu or, for that matter, Google. The deluge continued this year: Through April, Tencent had joined another $4 billion worth of deals.

Just as striking, however, is Tencent's eagerness to make small deals like the Line0 play, investing seven-figure sums in modest ventures like travel agencies and cleaning services. It's a bit like China's effort to expand its territory by building islands atop tiny reefs in the South China Sea: It can look quixotic, until you consider the big picture and the long-term stakes.

ZIE ZHENGYI—IMAGINECHINA/AP



From left (opposite page): Gamers provide half of Tencent's revenue, but PC-game sales growth has been slowing; Tencent-backed WeBank could steer more business to Tencent's e-commerce partners; WeChat, Tencent's social network and messaging platform, has a half-billion users.

WEBANK: ZHOU JUNXIANG—IMAGINECHINA/AP; PHONES: ZHOU ZHONGWEI—IMAGINECHINA/AP

Known for avoiding the press, Tencent declined *Fortune*'s repeated requests for interviews with executives. But in conversations with more than a dozen companies Tencent has backed, and with former Tencent employees, consultants, and analysts who follow the company, a clear strategy emerges: a quest to make Tenpay, and by extension Tencent, dominant in online finance.

Tencent wants to create a socializing and shopping universe that users never have to leave. That means investing in dozens of retailers and service providers and connecting them with hundreds of millions of potential customers on WeChat. More important, it means controlling the payment system that links this universe together—which could add billions of dollars to Tencent's top line. Tencent generally doesn't take controlling stakes in the companies it funds, but it expects startups to use Tenpay, analysts say. Lately the pay network and the web of Tencent-backed ventures have grown in tandem: The company now says more than 100 million WeChat accounts are linked to bank accounts—some observers think the actual number is double that—up from almost none at the beginning of 2014.

Online payment systems and their partner marketplaces have piggybacked before. (Case in point: eBay and PayPal, which investors valued at more than $40 billion when it spun off in July.) And Tencent is very much playing catch-up with rival Alibaba, whose Alipay service dominates China's mobile-payment market.

But given that online finance looks like the next great opportunity in China's 650 million–user Internet market, and that growth in Tencent's core PC game division is slowing, the business is too good to miss. "If you own payment, it's like owning the app store on iOS or Google," says HSBC's China Internet analyst, Chi Tsang. "You collect a percentage on everything." Take the analogy a little further, and it could be like owning a new MasterCard or Visa—in a huge market where consumers are just growing accustomed to using credit cards.

UNLIKE ALIBABA (widely viewed as the Amazon and eBay of China) or Baidu (China's Google), Tencent doesn't have a clear American web equivalent. The company is a social platform like Facebook, an online games giant with bigger sales than Zynga in its heyday, and a video and news site similar to the Huffington Post—lately with a VC firm like Andreessen Horowitz grafted on.

It's a lucrative agglomeration. In 2014, Tencent earned a $3.9 billion profit on $12.8 billion of revenue, numbers slightly better than Facebook's; those figures were up 53% and 30%, respectively, from 2013, and sales have been growing at a pace that should make Tencent a member of *Fortune*'s Global 500 by 2018. With headquarters in Shenzhen, across the waters from Hong Kong, Tencent has more than 27,000 employees and $4 billion in cash, and as measured by its market capitalization (which briefly topped $200 billion in April), it's one of the 40 most valuable companies in the world.

In the first quarter of 2015, online games were responsible for more than 50% of Tencent's revenues; social networking accounted for about 25%; and less than 15% came from advertising. The company's roots, though, are in messaging and social media. Back in 1999, Tencent's instant-messaging service, QQ (an imitation of an Israeli service called ICQ), became an overnight sensation, eventually amassing more than 800 million users. In 2011, Tencent outdid itself with WeChat (Weixin in Chinese), which quickly passed QQ in the app rankings in China.

Goldman Sachs vets James Mitchell (left) and Martin Lau (center) have shaped the investing strategy for Tencent founder Ma Huateng (right).

BRENT LEWIN—BLOOMBERG VIA GETTY IMAGES

Today WeChat has half-a-billion users from across China, urban and rural alike, who can post pictures on their Moments page (à la Facebook's News Feed) or chat in small groups. And with their easy integration of animation and photos, WeChat message streams make Facebook Messenger look Neolithic. But what makes WeChat truly stand out, compared with Facebook and other social networks, is that it has found a way to make its users spend real money—buying stuff from partner companies in which Tencent has a stake, and using Tencent's own PayPal-like payments method. Social network users routinely reserve taxis on WeChat; order takeout from Tencent-backed Dianping, which lets them scan menus and read restaurant reviews; and then click to shop at Tencent-backed retailer JD.com, Alibaba's biggest e-commerce rival. In minutes they've blown through $50 on cabs, dumplings, and T-shirts—and all the transactions have gone through Tenpay.

For Tencent, this self-contained money flow represents an unequaled revenue opportunity. The amount of mobile payments in China is expected to triple to $3 trillion in 2018 from $1 trillion in 2014, according to iResearch. If Tencent can command even a third of total transactions through its payment platforms and charges a conservative transaction fee, e-payment revenues could easily reach $5 billion a year—more than a third of Tencent's current revenue. Every relationship with a Line0 or Dianping brings new blocks of people into Tencent's payments universe. "It's not just about adding a product or user base," says a former Tencent developer. "It's uniting an army."

That mentality explains why Tencent's venture capitalism differs so greatly from the American model, where VCs on Sand Hill Road grow rich from their early (some would say lucky) bets on Twitter, Facebook, and Google. Instead of trying to pick freestanding winners, Tencent is investing in small companies in the hope that they'll drive revenue for its core businesses. To get a sense of what Tencent is doing, imagine Elon Musk investing in satellites that need to be shot into space on his SpaceX rockets, or Jeff Bezos investing in diaper makers and toy companies so that they'll sell more stuff through Amazon.com.

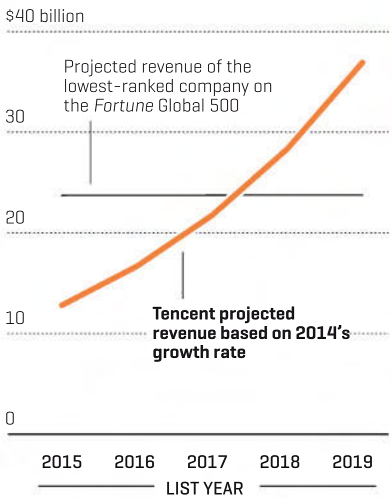
SOME OF TENCENT'S investments in 2014 were big enough to make headlines overseas: The company paid $215 million for a 15% stake in JD.com; an estimated $400 million for 20% of Dianping; $145 million for 10% of online fashion retailer Koudai. But most of its deals were small, focused on startups with little in common other than users who buy things—and buy them often.

Woqu ("I go") founder and CEO Ivan Huang started an online travel site that offered Chinese customers only one destination: America. "The U.S. is such a big country, we can offer vast products, including flights, car rentals, motor homes," Huang explains. He has 200 employees in two offices, presided over by a grinning, omnipresent hippopotamus mascot. A mural in the Beijing office shows half-a-dozen hippos exiting a plane into a waiting Woqu-booked limo, checking into a Woqu-reserved hotel, and joining a Woqu-booked tour group. Woqu has 20,000 monthly users and about $3 million a month in sales; the company got $20 million from Tencent and others last year.

In 2013, Yun Tao, a round-faced 29-year-old from China's Inner Mongolia province who looks like a grownup version of Buzz from *Home Alone*, started a cleaning service called E Jia Jie. His maids crisscross Beijing with their own solvents, charging rates starting at $4 an hour. Last year E Jia Jie found itself juggling funding offers from both Alibaba and Tencent—"Alibaba wanted to come in at 2 p.m. and sign a contract, knowing that Tencent was scheduled to come in at 4 p.m.," says Yun—but he eventually accepted Tencent's $5 million.

Guahao, an online reservation service that helps its 100 million users make appointments in China's crowded hospitals, received about $100 million from Tencent in 2014. As co-founder Zhang Xiaochun says, meaning it as a compliment, "They leave us alone." That's a common theme among Tencent-funded entrepreneurs. Woqu's Huang went with Tencent because he was convinced it wouldn't meddle in his

AT ITS CURRENT GROWTH RATE, TENCENT WILL JOIN THE GLOBAL 500 IN 2018.



business; Yun chose it in part because he had heard from friends that Alibaba made changes at companies it backed.

The theme is surprising because, not long ago, Tencent had a reputation for bullying smaller rivals. In 2010 a Chinese tech magazine featured a satirical depiction of Tencent's smiling-penguin mascot on its cover, promoting a story that concluded, "They don't create, just follow suit" (according to a translation). "Two years ago they had a fearsome reputation as being hostile—i.e., [they'd] clone your product and gobble you up alive," says Rui Ma, an angel investor in China. "They've been much more collaborative since then."

Startup distrust may not have completely evaporated, but observers give a couple of Goldman Sachs alums credit for working to dispel it. James Mitchell, Tencent's chief strategy officer, joined the company in 2011 after leading Goldman's research team in Manhattan analyzing Internet and media companies. When he arrived he didn't speak the language and wasn't a China hand, but he brought a banker's sensibilities for relationships and politics. (He's also a fast learner: These days Mitchell, a U.K. native, holds forth in Chinese at the monthly strategy meeting.) The company's soft-spoken president, Martin Lau, is another Goldman veteran from Hong Kong; he arrived in 2005. Former Tencent employees say Mitchell and Lau helped persuade the company's co-founder and CEO, Ma Huateng (known as Pony Ma), to off-load capital-intensive divisions in search and e-commerce and focus on partnerships.

From Tencent's perspective, the partner companies don't even have to be profitable. A case in point is the Uber-like taxi-hailing app Didi Dache, which beams your location to nearby yellow cabs. It is hugely popular, with more than 100 million users, and it raised $700 million last year in a funding round that included Tencent. Still, the business

CHINA'S BIGGEST TECH VC DEALS

China's tech companies have become magnets for venture capital, and Tencent is one of the busiest players in the field. Here are the five biggest funding rounds in Chinese tech since the beginning of 2014—all involving "unicorns" now valued at $1 billion or more.

COMPANY	ROUND DATE	ROUND SIZE ($U.S.)	COMPANY DESCRIPTION
DIDI KUAIDI	7/2015	$2 billion	Uber competitor Didi Kuaidi is the product of a merger of two popular taxi-hailing apps—Tencent-backed Didi Dache being one.
XIAOMI	12/2014	$1.1 billion	This funding round, which valued Xiaomi at $46 billion, made the smartphone maker the world's largest unicorn.
ZHONG AN ONLINE	6/2015	$931 million	China's first online insurance agency, launched in 2013. Tencent and Alibaba were founding investors; newer ones include Morgan Stanley.
DIANPING	4/2015	$850 million	Dianping lets users read restaurant reviews and make reservations. Tencent bought a 20% stake in 2014, and joined this round as well.
DIDI DACHE	12/2014	$700 million	Tencent was one of Didi Dache's biggest backers; the service lost money but steered customers to Tencent's online payment system.

SOURCES: PREQIN; CB INSIGHTS; COMPANY ANNOUNCEMENTS

lost tens of millions of dollars in 2014, analysts say, as it offered margin-destroying discounts in a fight for market share against an Alibaba-backed taxi app, Kuaidi Dache.

Those two services ended up merging in February, in a new company that has both Tencent and Aliababa as investors. But by then Tencent already had what it cared about most: millions of new payment accounts from passengers who used Tenpay to transfer money to drivers. Cynthia Meng, an analyst at Jefferies in Hong Kong, says the Didi Dache deal fits Tencent's modus operandi. "It's all to potentially convert their existing user base into payments users so they capture the growth of e-commerce," she says.

Converting shoppers into payment users, of course, is how Tencent's biggest rival came to dominate China's mobile-payment market. Alibaba's Alipay currently has an 80% market share, according to iResearch, and claims about 350 million registered users. Walk down any street in urban China, and you'll see its logo: The company has forged payment partnerships with brick-and-mortar retailers (including U.S.-based giants Walmart and KFC) and dominates "peer-to-peer" transfers, which allow consumers to send money to each other. In June an executive at Alibaba's payments subsidiary told *Fortune*, "With Alipay, you could leave the house with just your cellphone and no cash or cards, and chances are you will survive."

But Alipay's advantage isn't insurmountable. The service's lead is still driven by sales on its shopping sites Taobao and Tmall, which even the most fanatic shoppers use only a couple of times a week. Tencent, in contrast, is building a network of services that could be used more than once a day. And thanks to that network, WeChat is now a backbone for online-to-offline services, a "sector even larger than online shopping" in China, says iResearch analyst Will Tao.

"They're adding more and more services onto their platform so that people can have a one-stop shop," says analyst Elinor Leung of CLSA in Hong Kong. Leung estimates that Tencent's payment network is already worth $20 billion—a tenth of Tencent's market capitalization—and has the potential to grow a lot more. In an earnings call in May, Tencent president Lau said the payment system

creates a virtuous cycle. "You need to have more merchants; then you can actually attract more users," he said. "And then by having more users, you can actually attract more merchants."

IN JANUARY, China's second-most-powerful Communist, Premier Li Keqiang, traveled to Shenzhen to christen Tencent's newest creation: WeBank, the country's first online bank. Li gushed as though China had gone to the moon. "It's one small step for WeBank, one giant step for financial reform," he said, surrounded by cheering Tencent employees wearing WeBank T-shirts.

Since China opened to the world in the 1980s, finance has been controlled by a group of stodgy state-owned banks. But regulations are changing fast, and the tech giants are leading the charge. At the moment WeBank is tiny in terms of deposits. (Tencent owns 30% of the venture; it has investment firm partners.) Paired with WeChat payments, however, it has the potential to be enormous: Imagine Apple syncing Apple Pay with an Apple bank.

WeBank will bring in deposits and could offer loans to boost the services WeChat users are flocking to. And Tencent has other finance experiments on the drawing board. Bitauto, a Chinese online car-listing portal that trades on the NYSE, received a $1.5 billion joint investment from JD.com and Tencent in January; Bitauto is now exploring ways to derive a customer's credit rating from WeChat activity, eliminating the need for a formal credit report. Bitauto CEO William Li says Tencent offers what China's other tech giants can't. "You can buy expensive search placement on Baidu, so a partnership is not necessary. Alibaba is just a marketplace," Li says. "But Tencent—it wants to connect services."

Credit ratings and car loans may seem like a stretch for a social-networking and online-games company. But, of course, so do maids on motor scooters, hospital patients, and globe-trotting hippopotami—all of which already fit under Tencent's venture capital umbrella. The network of services keeps growing. Now Tencent needs to make sure Tenpay makes it profitable.

TWITTER *@scendrowski*

METALS INDUSTRY STARS SHINE

The **2015 Platts Global Metal Awards** recognize accomplished companies in industries from iron ore to aluminum.

WHEN GLOBAL METALS industry leaders donned their black-tie attire to attend the Platts Global Metals Awards Gala on May 21 at the Savoy hotel in London, it was a big moment for Brazilian iron ore producer New Steel—a David among Goliath metals companies. The awards program recognizes companies that have excelled in the global metals industry; New Steel, based in Rio de Janeiro, won the award for Breakthrough Innovation of the Year—a recognition given to a company that has developed a promising new technology.

New Steel won its prize for inventing what it calls a dry concentration process technology for the iron ore industry. "This prize for us was really a great achievement," says CEO Gustavo Emina, co-founder and CEO of the 100-employee company, noting that many of the 10 other finalists were large corporations. "I think it's proof that we have a world-class team creating world-class solutions."

The other winners experienced their own moments in the spotlight at the awards program. Alcoa was selected as Metals Company of the Year. Other firms and people were recognized in categories such as CEO of the Year, Corporate Social Responsibility, Deal of the Year, Lifetime Achievement, Metals Distributor of the Year, and Rising Star. There were also winners for industry leadership in the categories of aluminum; base metals; raw materials and mining; scrap and recycling; and steel.

Founded in 1909, Platts, owned by McGraw-Hill Financial, is a provider of information on the energy, petrochemicals, metals, and agriculture sectors, and of benchmark price assessments for those markets. The Platts Global Metals Awards follows the model of its other well-known industry event, the Platts Global Energy Awards.

The metals winners were chosen by a panel of international executives with expertise in regulation, corporate leadership, trading, and technology. This year's panel included industry leaders Alberto Hassan, former president and CEO of Orinoco Iron; David E. King, former CEO and director of LME; Jim Lennon, former chairman of commodities research at Macquarie; and Rana Som, former chairman of NMDC and Hindustan Copper. The judges determined the winners by looking at factors such as their benefit to the community, customer care and satisfaction, financial results, operational excellence, and peer recognition. The judging process began in March.

Mario Longhi, president and CEO of United States Steel, won CEO of the Year. "Platts is a very reputable institution that is very familiar with—and well versed

PLATTS 2015 GLOBAL METALS AWARDS

in—the universe of metals and mining," says Longhi. "To have been selected—as a company creating a transformational effort by bringing value to all stakeholders—is very significant. I'm personally very honored to have been chosen."

For U. S. Steel's team, Longhi says, the award has been highly motivating. "This is a very solid recognition of the work and value we are delivering," he says. "Our business is cyclical, and always under pressure."

This has been a challenging year for many in the metals industry. For instance, surpluses in China's mills have driven down the price of steel. Meanwhile, the price of iron ore is also down, as demand from China's steel furnaces has dipped. "Hard times have replaced boom times," says New Steel's Emina.

But in crisis, there is opportunity: New Steel's innovative process improves the recovery of iron ore fines—particles or powders of fine iron ore. Traditional iron ore processing requires a considerable amount of water, and New Steel's new waterless process reduces environmental impact, says Emina. It also reduces the cost of processing the material, which helps clients offset the decline in the price of iron ore, according to Emina. "We are reducing water and energy consumption," he says. "They need new technologies because some projects are not feasible anymore. In the next two years, we want to be very aggressive worldwide."

In recognizing the industry's achievements, the Platts Global Metals Awards demonstrate that when it comes to efforts toward sustainable development, operational excellence, and commitment to community, such companies are putting the pedal to the metal. ●

The 2015 Platts Global Metals Awards Winners

- ❑ *Metals Company of the Year*
  Alcoa
- ❑ *Breakthrough Innovation of the Year*
  New Steel
- ❑ *CEO of the Year*
  Mario Longhi, United States Steel Corporation
- ❑ *Corporate Social Responsibility Award*
  Teck Resources Ltd
- ❑ *Deal of the Year*
  International Coal Venture Pvt. Ltd.
- ❑ *Lifetime Achievement Award*
  Tadeu Nardocci, Novelis
- ❑ *Metals Distributor of the Year*
  Klein Steel Service Inc.
- ❑ *Rising Star Award*
  Egyptian Steel
- ❑ *Industry Leadership for Aluminum*
  Alcoa
- ❑ *Industry Leadership for Base Metals*
  Hindustan Zinc Ltd.
- ❑ *Industry Leadership Award for Raw Materials & Mining*
  NMDC Ltd.
- ❑ *Industry Leadership Award for Scrap & Recycling*
  NEMAK *(Premium Alloys Unit)*
- ❑ *Industry Leadership Award for Steel*
  JSW Steel Ltd.

THE MOST WIRED CITY IN THE WORLD

BARCELONA is a showcase for the “smart” metropolis of the future—in which tech giants like Cisco, Microsoft, and IBM see big profits in helping governments save by tracking data on everything from garbage to traffic to selfies. But not everyone is happy about this new urban reality.

Tourists (seen photographing the Antoni Gaudí Museum in Barcelona) can use Wi-Fi from a lamppost to send selfies. The technology monitors traffic (human and auto), noise, temperature, and much more.

BY **VIVIENNE WALT**

PHOTOGRAPHS BY
JOAN TOMÁS

THE SUN is still high in the sky on a June evening in Barcelona when Juan Blanco, Cisco's business development director for southern Europe, takes me on a walk through the city's medieval quarter, with its twisting alleyways and sidewalk cafés spilling over with people. As we enter a cobblestone square where the centuries-old El Born market hall stands, Blanco asks, "Notice anything unusual here?" At first I don't. It looks like a typical Mediterranean city in full summer splendor, with nothing out of place—nothing, that is, until I look up and spot the curved plastic shields affixed to the lampposts at a height of about 30 feet, each with a few metal boxes inside. "Those?" I ask.

Those, indeed. The boxes are no regular electricity meters. They are fine-tuned computer systems, capable of measuring noise, traffic, pollution, crowds, even the number of selfies posted from the street. They are the future of Barcelona, and in some sense they are the future for all of us too. The hard drives are just one piece of what is "unusual" on this street, in fact. Cast your eyes down, and you might spot the digital chips plugged into garbage containers, or the soda-can-size sensors rammed into the asphalt under the parking spaces.

Then again, you might not notice anything. Discreet and largely unannounced, the changes in Barcelona have slipped by even observant residents and the millions of tourists who pour into Spain's second-biggest city every summer to soak up its tapas, music, and beaches. Yet the stealthy transformation is profound and potentially so sweeping that no one is sure where it will lead. "Our lives have changed totally in the past 10 years thanks to smartphones," says Josép Ramon Ferrer, a telecom engineer who until late June was Barcelona's smart-city director, charged with shepherding its digital overhaul. "The management of cities has not changed that much until now. But in the next 10 years, cities will change totally."

If you want a glimpse of the very near future, one good place to start is this graceful, breezy seaside city of about 2 million people. In times past, Barcelona was famous for its revolutionary artists, like the painter Joan Miró and the architect Antoni Gaudí. But in just the last four years it has carved out a role in a revolution of a different kind: creating a blueprint for the city of the 21st century at a moment when urban dwelling is ever more predominant. According to the UN, about 84% of people will live in cities by the end of the century.

WHETHER IN CITIES OR VILLAGES, our modern lives are already saturated in vast amounts of data. The dimensions are almost impossible to grasp: 104,000 YouTube videos are streamed every second, and 2.4 million emails are sent per second. Or rather, those were the figures at the time that sentence was written; they are accelerating at warp speed. The market intelligence organization International Data Corp. (IDC) estimates that by 2020, about 30 billion embedded devices—the Internet of Everything—will monitor and manage countless activities in our lives, from the moment we awake to the moment we fall asleep, from catching the bus to filling the refrigerator, walking the dog, and watering the garden.

For cities the possibilities seem endless. Officials around the world who find themselves grappling with tight budgets and rocketing bills have seized on this tsunami of data as a way to cut costs and overhaul systems that have barely changed in decades. Juniper Research, which this year ranked Barcelona its No. 1 smart city, estimates cities will save about $17 billion a year in energy bills by 2019 by installing smart streetlights and devices like parking and garbage sensors. "The smart-city concept is barely off the ground," says Juniper senior analyst Steffen Sorrell. "The endgame figure will be much larger." Indeed, McKinsey Global Institute says in a June report that by 2025 cities will save up to $1.7 trillion a year in delivering services if they deploy new digital systems on a large scale.

For all the eye-popping estimates of future savings, the financial promise remains largely abstract, however. Cities sign on, many at little cost, believing the projects will pay off big. In Europe the EU has committed funds for some cities to upgrade their systems, masking the true expense. "Many of these are pilot projects funded by suppliers or R&D funds," says Eric Woods, research director in London for the U.S. analytics company Navigant Research. "It will become so cheap to include a sensor in a waste collection point, and to collect the data, that service operators will do it as a default."

Clearly city officials are hoping the outsize estimates of savings prove true. Boston, for example, has inserted sensors to monitor transportation, parking, and energy use, and installed solar-powered street benches that measure pollution and noise. London is developing 3-D maps of its underground wires and pipes to try to stop different utilities from repeatedly digging up the same roads. Hamburg's port, which handles about 10,000 ships a year, recently computerized its loading systems to synchronize offloading and reduce diesel-choking traffic jams.

The smart-city rush extends beyond the af-

A bus station on Avenida Diagonal offers touchscreens with information on transportation and events, along with free Wi-Fi and USB ports.

THE TERM "smart cities" was barely in use when Cisco began testing its ideas in Barcelona in 2011. The company had invested heavily in Songdo, a South Korean business district built from scratch almost as a high-tech experiment, with a network of sensors controlling everything from escalators (they move only when someone steps on them) to classrooms (remote connections with schools abroad). But there were limited numbers of brand-new "green field" places in which to invest. Cisco knew it would need to sell systems to creaking old cities if it was to grow its smart-city business.

Barcelona, which dates back to the ancient Romans, proved an ideal candidate. Its mayor, Xavier Trias (one of *Fortune*'s 50 world's greatest leaders last year), had argued during his election campaign in 2011 that Barcelona's economic future would increasingly depend on digitizing its public services. Spain was then languishing through its worst recession in decades, deep in debt, with one in four young Spaniards out of work. Hundreds of thousands of protesters calling themselves *indignados* were regularly storming the streets of Barcelona and Madrid, burning barricades and raging against austerity budgets.

To tech companies, none of that mattered. Barcelona already had a thriving startup scene: As part of hosting the Summer Olympics in 1992, it had converted its abandoned textile-factory district into a tech hub called @22, which now houses dozens of startups, and laid a network of fiber-optic cables that today covers 310 square miles. The existing fiber-optic cables alone cut the upfront cost of the smart-city programs from what might have been 300 million euros to about 30 million euros, according to Ferrer. Another factor made Barcelona gold for tech giants: Barcelona Football Club, one of the richest, best soccer teams on the planet, and the Mobile World Congress, which about 90,000 tech executives and journalists attend each March. "This city has international branding," Blanco says. "So anything we develop we can expose to the rest of the world."

Like most cities, Barcelona had added services haphazardly over the decades. Vicente Guillart, who runs the Institution for Advanced Architecture of Catalonia, says he was initially skeptical, believing smart-city tech was "just about companies trying to sell you some-

fluent West. Indian Prime Minister Narendra Modi promised during his election campaign last year to build or retrofit 100 wired metropolises by 2022 at a cost of $1 trillion. In June the Indian government published a call for companies to compete for a major rollout of smart-city systems. Its "request for interest" report makes enticing reading for tech companies: The government estimates that about 500 million people—40% of the country's population—will live in Indian cities by 2030. And all of those, it says, have a "crying need" for high-tech infrastructure. The benefits for cities seem clear: more ordered, clean, coordinated services, at lower cost.

The tech companies that build this new infrastructure stand to gain even more. IBM, Cisco, and Microsoft, all of which have invested heavily in developing and manufacturing pieces of the infrastructure, see cities as a key to growth. Navigant estimates that by 2023 technology companies will do about $27.5 billion a year in smart-city business.

To hear Blanco of Cisco tell it, the world is moving to a business equivalent of the clash between ancient city-states. "In the 19th century empires competed. In the 20th century countries competed," he says. "In the 21st century cities compete." He tears a piece of paper from my notebook and draws a graph with a straight upward slope. "Cisco's revenue over the last 20 years has very closely tracked the growth of Internet use," Blanco says. "This is very simple math. The more people there are on the Internet, the more we grow."

PREVIOUS SPREAD PHOTO: REPORTAGE BY GETTY IMAGES

thing." He was won over after studying Barcelona's tangled services and signed on to become chief architect under Trias. "Before, the city was organized like silos," he says. "Lighting didn't talk to traffic didn't talk to water. Each had its own budget with its own data and its own cameras."

Underground, the wastefulness looked worse. "Five years ago you could go into a tunnel under Barcelona, and there would be four or five different telephone cables," says Cisco's Blanco. "Each was fiber optic. And each was using about 5% of its capacity." The solution was to knit the services into one system under a single company—the Spanish tower operator Cellnex Telecom won the bid—to run the network and sell spare capacity, generating revenues for the city.

Only parts of Barcelona have been rewired so far. But the results are already visible. Sensors measure how full trash containers are, allowing garbage trucks to empty them only once they're filled. Parking-space sensors tell drivers, via a phone app, which are vacant, so they avoid circling around. Barcelona reworked its bus routes into an efficient grid rather than the confusing tangle that existed before, increasing ridership 30% in four years. Electronic bus stops now show schedules and local sights, and could soon have ads tailored to the neighborhood.

Those sleek new lampposts along the grand avenues? They are not for aesthetic beauty. Hollow inside, they have fiber-optic cables running up them. Each has its own IP address, turning it into a telecommunications tower, with the capability to monitor crowds, noise, weather, and traffic from a Wi-Fi router on top. Now if a crowd of drunken tourists wakes up El Born neighborhood at 2 a.m. (a frequent gripe), there is no need to call the cops: They already know the precise decibel level.

ALVINYÀ'S VISION FOR BARCELONA'S TECHNOLOGY COULD LEAVE MANY UNEASY. "WE CAN KNOW WHERE YOU ARE FROM," HE SAYS, "WHERE YOU ARE SHOPPING, AND AT WHAT HOURS."

Once in place, all this technology is astonishingly simple to manage. One afternoon Jordi Alvinyà, commercial-strategy director for Cellnex, takes me into Barcelona's high-security control center, which adjoins the tower Norman Foster designed for the Olympics, with jaw-dropping views. Inside, some 10 engineers in shorts and sneakers sit at screens, monitoring beeps and flickers that tell them in real time whether a streetlight is dead or a pipe is leaking. As we walk out, Alvinyà glances at a refrigerator-size box. "All the policing and security of the city is in that," he says.

Cisco's Juan Blanco (left) and Jordi Alvinyà of Cellnex. The companies are key tech providers to Barcelona.

BARCELONA OFFICIALS believed another step was crucial: creating an operating system to run the entire city within one interface. In a café on the Passeig de Grácia, the city's main boulevard, the outgoing smart-city director, Ferrer, whips out his iPhone 6 to show how he hit on the concept. "For me the cities of the future will be like a smartphone," he says. "We have a lot of hardware, but it isn't anything unless it interfaces with the OS. If there are 200 platforms and 200 providers, it is a mess and not sustainable."

In 2012, Barcelona put out a tender for tech companies to create its OS. The bidding was fierce: 18 companies competed in a process that dragged on for months. In the end, Ferrer signed a contract in May with a consortium comprising Accenture, GDF Suez, and Cellnex to build the system, for the pittance of about $1.6 million. "It was nothing," Ferrer says. "But for the companies, it was a chance for them to deploy solutions for a lot of cities in the world."

It all seems to make a lot of sense. Certainly it's logical that digital systems would drive down costs. But the smart-city world is replete with fuzzy projections, and the technology is so new that there are no concrete results to point to. Cisco estimates that Barcelona will see "cumulative economic benefits of 832 million euros by 2025," including 86.4 million euros in extra tourist spending, but offered little explanation of how it arrived at those figures.

That makes Barcelona a testing lab for a transformation that has only just begun. Four

years after Cisco invested in Barcelona, Blanco now shuttles between Barcelona and his home down the coast in Valencia, meeting a parade of city officials who have flown in from New York, Los Angeles, Buenos Aires, Dubai, Qatar, China, Kazakhstan, and elsewhere to examine how they can replicate the smart-city ideas; about 200 delegations have visited during the past year alone. "We don't necessarily make money in Barcelona," Blanco says, "but we will make it elsewhere, in other cities."

Companies are betting there will be billions to gain once Barcelona's OS is operating and can make sense of the mountains of data the new technology sucks up. Consider for a moment the possibilities of Wi-Fi-fitted lampposts, each with its own IP address, monitoring the numbers of Facebook posts, tweets, or credit card swipes as you stroll by with your smartphone (which identifies where you are from) and withdraw cash, buy shoes, drink a soda, and visit a museum. "We have millions of people coming off cruise ships, many of them Americans with higher incomes," Cellnex's Alvinyà tells me.

When I tell Alvinyà I don't want my movements tracked, he says, "Then use cash and leave your phone at home." Of course, most people do neither. "It is almost impossible for tourists not to send a photograph to friends back home," says Alvinyà, describing the gold mine of data the city will finally tap. Then, he says, "we can know where you are from, where you are shopping, and at what hours."

Ada Colau, Barcelona's new mayor, rose to fame protesting evictions and seems less enthusiastic about smart-city spending than her more business-oriented predecessor.

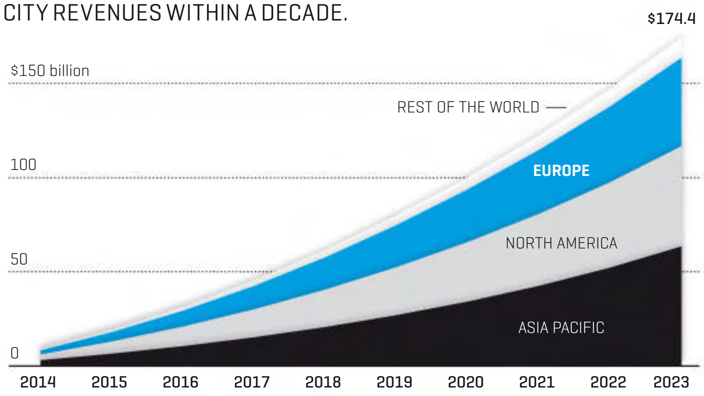
The prospect of a new incarnation of Big Brother leaves many people uneasy—as Rio de Janeiro discovered. As part of Rio's World Cup last year, IBM built a command center to knit together 30 service agencies and monitor floods, fires, and other potential disasters. It sounded positive until Mayor Eduardo Paes boasted that it "allows us to have people looking at every corner of the city, 24 hours a day, seven days a week." His words sparked outrage among some residents.

So far Barcelona has avoided the resentment. And by 2021 it will have its biggest data hub yet: Barcelona Football Club's new state-of-the-art complex. The team, which has star players Neymar Jr. and Lionel Messi, packs every game in its current 90,000-seat stadium, giving the club an extraordinary 600 million euros in yearly revenues, according to Josep Maria Bartomeu, the club president. But its new 105,000-seat stadium will offer new revenue streams by linking fans directly to merchandising with free Wi-Fi. It will also remove the fences around its 54-acre compound, which draws about 1.7 million tourists a year, creating a smart-city neighborhood in the middle of Barcelona. "We will have a permanent connection with technology," Bartomeu says. "Companies will get information about people who are there from all over the world."

That data collection is already underway. In September, Microsoft assigned Bismart, a local big-data startup, to analyze the spending of some of the 2 million people partying at Barcelona's annual four-day festival. Bismart monitored the credit card swipes of 448,000 tourists. The results were revealing. "We found that French people camp [rather than stay in hotels], and British people don't spend anything," Bismart CEO Albert Isern says. In years past, marketing

A WIRED FUTURE?

COMPANIES SUCH AS CISCO AND IBM ARE PROJECTED TO GENERATE A CUMULATIVE $175 BILLION IN SMART-CITY REVENUES WITHIN A DECADE.



GRAPHIC SOURCE: NAVIGANT

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Stand Up To Cancer is a program of the Entertainment Industry Foundation (EIF), a 501(c)(3) charitable organization. Photo by Nigel Parry.

companies would have tried to find those results by questioning tourists. “Manual surveys generally analyze 1% of data. Here we analyze 50%.”

FOR FOUR YEARS NOW, Barcelona’s smart-city program has seemed unstoppable. Then came May, when residents ousted Mayor Trias and voted in Ada Colau. She could scarcely be a more jolting contrast. At 41, she is 28 years younger than the business-friendly Trias and rose to fame as a feisty *indignado*, whom police arrested more than once during protests over apartment evictions. Colau vowed to rein in gentrification and tourism, which many feel are threatening to engulf Barcelona. She triumphed largely by casting Trias’s government as too closely tied to business, too focused on branding the city as a magnet for tech companies. “We have a real commitment to new technologies that go beyond just TV ads titled ‘Smart City,’” she told a reporter in April.

When I arrived in mid-June, one day after Colau’s inauguration, it was clear the smart-city brand had taken a knock. In her first month in office, Colau canceled Barcelona’s bid for the 2026 Winter Olympics and announced that the city would not do business with banks implicated in evicting delinquent mortgage holders. “We are going to change our focus to social issues, like analyzing which apartments are unoccupied, for example,” Bismart CEO Isern says. “Data is like a knife,” he says. “We can use it to cut food or kill people.”

So far, Barcelona’s new leaders are not sure what kind of knife smart-city technology is. When I catch Colau outside a meeting one morning, she says she “still needs to study the issue.” But the previous evening Barcelona’s new deputy mayor, Gerardo Pisarello, told me the new regime had a very different view from the smart-city cheerleaders they ousted. “We’ve spoken about smart citizens. That is what we need—not just a smart city,” he tells me. “We want technology to reach the poorest neighborhoods. That is what a ‘smart city’ is to us.”

Barcelona’s political earthquake has shaken smart-city devotees into realizing that not all politicians may share their vision about digitizing their cities, especially given the perpetual lack of cash. Those concerns are not unique to Barcelona. Indians have questioned whether Modi’s new smart cities will exclude poor people. Londoners have pooh-poohed some digital overhauls as a waste of their tax money. The technology might need to prove its true value (which, of course, it can’t do until a sizable locale rolls it out and gives it time to succeed or fail). “The need is clear in the cities,” says Woods of Navigant. “What is less clear is how cities roll out these solutions at scale, and how they will find the financial means to do so.”

In truth, it might be too late for Barcelona’s new mayor to stop the clock, given that many smart-city programs are already underway. The real wrangle will be over whether profits and social good can co-exist in harmony. “The Internet of Everything is going to happen,” says Guillart, the architect. “The only question now is, Who is going to rule it?”

LIGHTS! COMPUTERS! CAMERAS!

URBAN AREAS AROUND THE GLOBE ARE GOING HIGH TECH.

NICKY LOH—BLOOMBERG/GETTY IMAGES

The movies might still depict **Los Angeles** as a smoggy crime den, but L.A. has moved on. It has retrofitted 150,000 streetlights with light-emitting diode (LED) technology since 2009, shaving more than $7 million annually from its energy bills and, city officials say, cutting nighttime crime rates too. And this year it wired the lights to chips, allowing it to control light levels remotely and immediately spot those that go out. With the cost of LED lights dropping fast, “I think we are going to see a major, major wave of retrofits,” says L.A.’s streetlight director, Ed Ebrahimian.

Across the Pacific, **Singapore** (above) has instituted nationwide fiber-optic broadband and driverless-car programs in some areas, and it has opened about 90 computer hubs to teach skills to senior citizens and recruit them to teach others.

In Europe, **Stockholm** residents voted in 2006 to install cameras at entry points to the capital and charge each driver entering the city. The system, which IBM built in just two months, has cut air pollution by 14% and traffic congestion by 22%—a success, though a word of advice to other cities: Glitches can cause widespread griping. “It must be perfect from day one,” says Birger Höök, Stockholm’s former traffic director.

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If you or your company used the services of certain freight forwarders, you may be entitled to a potentially significant cash payment from class action Settlements. This is the second notice in this case. Settlements have now been reached with 19 additional Defendants. Settlements were previously reached with 10 Defendants.

The Settlements involve a lawsuit claiming that certain freight forwarding companies secretly agreed to prices for their freight forwarding services worldwide, including on routes in the U.S. and between the U.S. and China, Hong Kong, Japan, Taiwan, India, Germany, the U.K. and other parts of Europe. Some of the companies ("Settling Defendants") that were sued have agreed to Settlements (see list below). The Settling Defendants deny that they did anything wrong. The lawsuit continues against the Non-Settling Defendants.

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What Do the Settlements Provide?

The Settling Defendants will establish a Settlement Fund with a minimum of $197.6 million. The amount of your benefits will be determined by the Plan of Allocation, which is posted on the settlement website at www.FreightForwardCase.com.

How to Get Benefits?

You need to submit a Claim Form, online or by mail, by **March 31, 2016** to get a payment from the Settlements. You can obtain a Claim Form by calling one of the numbers below or by visiting the website. If you already submitted a Claim Form for the first round of Settlements, you do not need to file a new claim. You will automatically be paid from this second round of Settlements.

Your Other Rights

Even if you do nothing you will be bound by the Court's decisions. If you want to keep your right to sue a Settling Defendant yourself, you must exclude yourself by **September 18, 2015** from that Settlement. If you stay in a particular Settlement, you may object to it by **September 18, 2015**. The Detailed Notice, available at the website, explains how to exclude yourself and object.

The Court has appointed lawyers to represent you at no charge to you. You may hire your own lawyer at your own cost. The Court will hold a hearing on **November 2, 2015** to consider whether to approve: (1) the Settlements, (2) a request for attorneys' fees up to 33% of the Settlement Fund, plus interest, and reimbursement for litigation expenses. You or your own lawyer may appear and speak at the hearing. At the end of this litigation Class Counsel may ask the Court to award each Class Representative an amount not to exceed $75,000 in recognition of each Class Representative's service in recovering funds for the Class. Notice of any such request will be provided at the website, www.FreightForwardCase.com.

This notice is only a summary. For detailed information:

Call U.S. & CANADA: 1-877-276-7340 (Toll-Free) INTERNATIONAL: 1-503-520-4400 (Toll)

or Visit www.FreightForwardCase.com

The "Settling Defendants" are SDV Logistique Internationale ("SDV"); Panalpina World Transport (Holding) Ltd. and Panalpina, Inc. ("Panalpina"); Geodis S.A. and Geodis Wilson USA, Inc. ("Geodis"); DSV A/S, DSV Solutions Holding A/S, and DSV Air & Sea Ltd. ("DSV"); Jet Speed Logistics, Ltd., Jet-Speed Air Cargo Forwarders Inc. (USA), and Jet Speed Logistics (USA), LLC ("Jet Speed"); Toll Global Forwarding (USA), Inc., Baltrans Logistics, Inc., and Toll Holdings, Ltd. ("Toll"); Agility Holdings, Inc., Agility Logistics Corp., Geologistics Corp., and Geologistics International Management (Bermuda) Limited ("Agility"); United Parcel Service, Inc. and UPS Supply Chain Solutions, Inc. ("UPS"); Dachser GmbH & Co., KG, doing business as Dachser Intelligent Logistics, and Dachser Transport of America, Inc. ("Dachser"); Deutsche Post AG, Danzas Corporation, DHL Express (USA) Inc., DHL Global Forwarding Japan K.K., DHL Japan Inc., Exel Global Logistics, Inc., and Air Express International USA, Inc. ("DHL") for the severed, Japanese claims only; Hankyu Hanshin Express Holding Corporation f/n/a Hankyu Express International Co., Ltd. and its subsidiary, Hankyu Hanshin Express Co., Ltd., and its U.S. subsidiary, Hanshin Air Cargo USA, Inc. ("Hankyu Hanshin"); Japan Aircargo Forwarders Association ("JAFA"); Kintetsu World Express, Inc. and its U.S. subsidiary, Kintetsu World Express (U.S.A), Inc. ("Kintetsu"); "K" Line Logistics, Ltd., and its U.S. subsidiary "K" Line Logistics (U.S.A.), Inc. (""K" Line"); MOL Logistics (Japan) Co., Ltd., and its U.S. subsidiary MOL Logistics (USA) Inc. ("MOL Logistics"); Nippon Express Co., Ltd. and its U.S. subsidiary, Nippon Express USA, Inc. ("Nippon Express"); Nissin Corporation and its U.S. subsidiary, Nissin International Transport U.S.A., Inc. ("Nissin"); Yamato Global Logistics Japan Co., Ltd., and its U.S. affiliate, Yamato Transport U.S.A. Inc. ("Yamato"); Yusen Air & Sea Service Co., Ltd. and its U.S. subsidiary, Yusen Air & Sea Service (U.S.A.), Inc. ("Yusen").

an OPEN LETTER to ELON MUSK

BY STANLEY BING

DEAR SIR: First of all, I'd like to take this opportunity to congratulate you on having achieved the status of a nation-state. Indeed, as capital has flowed away from public coffers into private ones like yours, you have become in many ways superior to the formal governments that now struggle under the burdens of defense, education, public health, maintenance of infrastructure, regulation of unruly citizens, and, of course, debt. All you have are a collection of highly coveted companies under your control that have produced gobs of capital, and the enviable duty to figure out how you want to spend that capital in pursuit of whatever strikes your fancy. (My condolences on the recent SpaceX unmanned rocket explosion. Just a hiccup, I'm sure.) And you are not alone. There are a surprising number of individuals in this world right now who are assuming the role once occupied by national entities, and so this letter is to them as well. Congratulations to you all. *L'état, c'est vous,* and more power to you.

But I'd like to suggest that this great standing should come with certain responsibilities that many of the governments of this world can no longer sustain. The wealth and power they once enjoyed has fled, and all that is left to them are the inevitabilities of creeping senescence, mounting disorganization, and inevitable penury and ruin. You know who I'm talking about. Greece, toppling like Atlas under its leaden globe of liability. Puerto Rico, likewise. The dog's breakfast that is the Middle East. Spain, God help us. Each of these—and there will be others who will need to be patched up so that they can go forward for a time, limping—has the potential to bring the rest of the capitalist world down with them into the pit. I think you'll agree that would be unfortunate for everybody, including you.

This is not a drill. We are witnessing the end of the Nation as an organizing principle. For a while it looked as if vast multinational corporations would take their place. But no. It turns out we are entering a world dominated by a new feudalism, where gigantic lords operate with impunity in a landscape no longer defined by borders, treaties, and the inconveniences of conflicting currencies and languages. You, Mr. Musk, are one such. And with admiration and respect, I would like to suggest that it is high time that you and others like you put aside your toy rockets and floating cars and Turing robots and visions of immortality and get serious. The world needs you to step up and fix things with your intelligence, wisdom, and, yes, money.

First, rectify Greece. By the time you read this, the big crisis that scared everybody from the EU to the NYSE may have passed, at least for a while, but what we've got is about 300 billion euros owed to just about everybody for the foreseeable future. Pay it off! You might have to make a couple of phone calls to your mega-peers to do it, but isn't that what J.P. Morgan did about a hundred years ago to save Wall Street? The Big Dudes get together. Write a check or two. Boom! We're back to the glory that was Greece, the grandeur that was you, baby.

After that, you can move on to your next task: neutralizing the forces of evil. I'm sure you can guess what I'm talking about there. You're a smart guy, Mr. Musk. You think the bad guys can rampage through other people's backyards with their financial systems reeling and an infinity of hard cash arrayed against their interests? I don't. In the past, there were governments that could sink obnoxious armadas. Now it's up to you and your nation-state brethren, perhaps Mr. Andreessen and maybe even Sergey and Larry and Marky Z. I guess at some point you guys might need an actual physical army of some kind to get the job done, but let's revisit that later. There may be issues to resolve in that arena. But it's pretty clear that money won't be one of them.

Anyway, if I've said anything that interests you, do let me know. We can have lunch—on me. That's the corporate rule, you know. Subordinates always pick up the check.

Follow Stanley Bing at stanleybing.com and on Twitter at @thebingblog.

ILLUSTRATION BY SHAUNA LYNN PANCZYSZYN; PHOTO SEEN IN ILLUSTRATION: KEVORK DJANSEZIAN/GETTY IMAGES

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